

79137

**100% DESIGN PHASE
MUNICIPAL WATER MAIN EXTENSION**

and

GROUNDWATER EXTRACTION SYSTEM

FORCE MAIN AND DISCHARGE FORCE MAIN

CONSOLIDATED RAIL CORPORATION — ELKHART YARD SITE

PREPARED BY:
WIGHTMAN PETRIE, INC.
2340 CASSOPOLIS ST., ELKHART, INDIANA

FOR:
CONRAIL, INC.
GROUNDWATER TECHNOLOGY, INC.

MARCH 1994

up



GROUNDWATER TECHNOLOGY

Groundwater Technology, Inc.

The Phoenix Bldg., 20 E. Union St., Suite 100, Wilkes-Barre, PA 18701-2706
Tel: (717) 829-0105 Fax: (717) 829-0390

April 1, 1994

Mr. Brad Bradley
Remedial Project Manager
U.S. EPA
77 West Jackson Blvd. HSRL-6J
Chicago, IL 60604

Dear Mr. Bradley:

On behalf of the Consolidated Rail Corporation (Conrail), Groundwater Technology, Inc. hereby submits the final design for the Municipal Water Main Extension and the Groundwater Extraction and Treatment Systems. The final design documents include modifications and revisions of the 30, 60, and 95% design submittals made in response to IDEM and EPA review and comments. Responses to EPA and IDEM comments listed in EPA's approval letter of the 95% Design dated February 18, 1994 and received by Conrail March 1, 1994, have been prepared and submitted under separate cover. The final design documents do include the changes to the specific sections of the design report mentioned by GTI in the response to the comment package, and therefore the agencies should consider the design documents as final and complete. During EPA's review of the final design documents, if there are any questions or comments which may impact permitting or material/equipment specifications, expedited communication would be appreciated so that we can try to avoid delays and rework in these areas. Please contact my office at any point during the agency's evaluation.

Sincerely,
GROUNDWATER TECHNOLOGY, INC.

David J. Demko, P.G.
Project Coordinator

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Offices throughout the U.S., Canada and Overseas

**Response to E.P.A. and I.D.E.M. Comments on the 95% Design
for Municipal Water Main Extension
(Conrail Elkhart Yard Site)
March 29, 1994**

Following are itemized responses to comments received after I.D.E.M.'s and U.S.E.P.A.'s review of the 95% Design Documents. Responses are provided for both sets of comments with I.D.E.M. comments addressed first.

Errors associated with drawing X-0183-1 are not addressed individually because the response is the same in all cases. While comments from the City of Elkhart regarding valve changes and relocations were incorporated on individual plan sheets, sheet X-0183-1 was not revised before the 95% design submittal was shipped.

Responses to General I.D.E.M. comments from I.D.E.M.'s cover letter:

One major concern arose during the review of these documents. This concern involves the final disposition of the carbon filtration systems in the homes. This issue was not addressed in the design discussion or in the specification for water service connections to the homes. There are two categories of filter systems of concern to IDEM: 1) filters installed by U.S. EPA or IDEM, and not maintained by Conrail; and 2) filters installed and maintained by IDEM after the execution of the Unilateral Administrative Order (Order). In some cases, IDEM has installed filter systems in homes that did not meet the action level criteria from the Order, yet showed detections of either trichloroethylene or carbon tetrachloride in the water well.

IDEM is concerned that if the filters are kept and possibly used by the resident, the resident will not properly maintain the filters and thus cause a hazard either to the plumbing system or possibly to their health. Conrail needs to address this possible hazard by adding additional criteria to the water service connections specification. Conrail should remove and properly dispose of the filter systems. If the resident desires to keep the filter system, as some have expressed, Conrail should have the resident sign a form stating that they agree to accept responsibility for the filters. The residents should understand that proper maintenance is required for the filters to work properly. This specification should be met before the resident receives a hookup to the water supply line. This type of specification will ensure the final disposition of the filter systems is documented or the resident is fully informed about how to maintain a filter that is left in their home. Conrail should apply this specification to both point of use and point of entry filter systems installed by either U.S. EPA, IDEM or Conrail.

Response:

The specification regarding water service connections (Item II ps 30) has been revised to include provisions to disconnect and remove the point of entry and the point of use filters where they exist. A sample notice letter and a release agreement are included herein. An informational brochure from the filter supplier who is currently maintaining the systems is also included for reference and is intended to provide the homeowner with a basic understanding for future filter maintenance.

Itemized Responses

Comment No. 15

Section 3.0. This section should be expanded to summarize the overall project (i.e. that the City of Elkhart line will be extended to provide water to the residential areas identified). One major issue that should be included is the crossing of the county lines and the different specifications that apply to each county. There should be discussion of the future use of the lines and the modifications that have been included (i.e. the stubs for future tie-in to Mishawaka and the connections included for expansion by Elkhart).

Response:

Section 3.0. (now Section 2.0) now includes a narrative to provide the reader with an understanding of how the systems serves both jurisdictions and what components have been included to allow for future system separation.

Comment No. 16 Page PS-30, Item 11. See general comments.

Response:

The specification has been revised to address well use with regard to home heating and cooling.

Comment No. 17

Design Drawings. Why were the Bay Street homes (approx. 2-3) excluded from service?

Response:

The water distribution system has been designed in compliance with Figure 3 of the Statement of Work. This figure shows the areas the system must supply. These are the areas covered in the 30%, 60%, and 95% designs. The Bay Street homes are not included in the SOW and were not included in the earlier design documents. Conrail is not aware of any new information that has become available after the design process began, suggesting that these residences are potentially at risk from a Railyard source. If U.S. EPA or IDEM believes there is new information, please identify what it is and forward to Conrail.

Response:

Addition of these homes to the project design will delay completion of the design and will delay construction.

Responses to U.S.E.P.A. General Comments.

General Comment No 2

Conrail should not wait for final U.S. EPA approval of the 100 percent design documents to apply for necessary permits. To the maximum extent possible, permit applications should be made immediately to avoid unnecessary delays in providing residents with clean water.

Response:

Conrail has submitted and is waiting for approval of the required water main extension agreement from the City of Elkhart. Permit applications to I.D.E.M. and I.N.D.O.T. require that this agreement be complete and in place before an application package can be submitted. The Elkhart Board of Public Works has scheduled final review of the proposed agreement at its regular April meeting.

General Comment No. 3

The subject of well abandonment at residences with a home cooling recirculation system must be discussed and resolved.

Response:

This contingency will be addressed during the construction phase of the project. The project engineer will work with the contractor to identify homes where heat pumps exist. In most cases recirculation cooling/heating systems utilize a well which is separate from the homes potable supply well. Where this is true, normal well abandonment will be carried out. For homes which have only one well, cross connections to potable supply lines will be permanently eliminated (as in the project specifications) and the well left in place with concurrent approval by EPA and IDEM.

General Comment No. 4

According to representatives of CLEAN, there are approximately nine residences in the far was end of the plume area, on Bay Street, that are not being hooked up to the water main extension per the 95 percent design. U.S. EPA would like these residences hooked up to the water main extension as they are arguably in the downgradient plume direction.

Response:

The water distribution system has been designed in compliance with Figure 3 of the Statement of Work. This Figure shows the areas the system must supply. These are areas covered in the 30%, 60%, and 95% designs. The Bay Street homes are not included in the SOW and were not included in the earlier design documents. Conrail is not aware of any new information that has become available after the design process began, suggesting that these residences are potentially at risk from a Railyard source. If U.S. EPA or IDEM believes there is new information, please identify what it is and

forward it to Conrail.

Addition of these homes to the project design will delay completion of the design and will possibly delay construction.

Itemized Responses - Design Report

Comment No. 1 Cover Letter - Issue #1 in the cover letter must be clarified and discussed.

Response:

A more detailed list of users was developed by Conrail at EPA's request and is included in Section 2.2.2. Conrail requests that this list be approved by E.P.A.. The list represents Conrails best effort to identify all of the parties Conrail is required to serve with municipal water service.

A discussion of how the list was prepared is included in Section 2.2.2.

Comment No. 2 - Chlorination System

Response:

Monitoring requirements for residual chlorine concentration in the water main have been added to Part 6 - Chlorination System of the Operation and Maintenance (O&M) Manual. Residual chlorine concentration monitoring at the fire pump station is also explained in this section of the O&M manual.

Comment 3 - Fire Pump Building Security

Response:

An entry alarm system has been specified for the Fire Pump Building. In addition, a night guard light has been added to the site plan design.

Comment 4 - Section 6, p. CQA-4 - A statement should be made that U.S. EPA and IDEM will be included in the pre-construction meeting.

Response:

Section 6 p. CQA-4 has been revised to include EPA and IDEM as participants in the pre-construction meeting.

Comment 5 - Section 6, Draft Temporary Easement Agreement - This agreement is overly burdensome and may need to be amended if residents refuse to sign it.

Response:

Field revision of the draft agreement may be done at Conrail's discretion. However Conrail's legal counsel believes this document affords the level of detail needed for this type of agreement.

Comment 6 - Section 7, p. HSP-6, Section 6 - A statement should be included in this section that contaminant levels will also drive the use of respirators.

Response:

Section 7 has been revised to reflect that contaminant levels will also drive the use of respirators.

Comment 7 - Section 8 - p. OM-2, The language in the second paragraph should be clarified.

Response:

A typographical error was included in this paragraph and has been corrected.

Comment 8 - Section 8 - p. OM -4, Table 2-1 should include proper units for values within the table (possibly gallons per minute).

Response:

The table has been changed to reflect the correct units which are gallons per minute.

Itemized Responses Design Drawings

Comment 1 - Sheet X-0183-1: Plate area X-0183-8 is missing a valve.

Response:

Valve corrections were made. This also refers to Comments No. 2, 4, 5, 6, 7, 8, 11, 12. Due to comments from the City of Elkhart valve changes were required. These changes were not reflected in sheet X-0183-1 before the 95% design submittal.

Comment 3 - Sheet X-0183-1: Plate area X-0183-13 does not show the full length of the water main as shown in the drawing on page X-0183-13.

Response:

Sheet X-0183-1 has been changed to reflect sheet X-0183-13.

Comment 9 - Sheet X-0183-1: Plate area X-0183-29 is missing a valve, the 8 inch D.I.

water main is not shown, and the match lines are incorrect.

Response:

Sheet X-0183-1 has been changed to correctly reflect the plan drawing and the match line has been corrected.

Comment 10 - Sheet X-0183-1: Plate area X-0183-31 is missing two valves and the 8 inch D.I. water main is not shown.

Response:

Sheet X-0183-1 has been changed to add the 8 inch D.I. water main and the valves have added to the drawing.

Comment 13 - Sheet X-0183-1: Plate area X-0183-32 is missing a valve and the match line is incorrect.

Response:

Sheet X-0183-1 has been changed to reflect sheet X-0183-32.

Comment 14 - Sheet X-0183-3: The table of itemized quantities lists two 6 inch hydrant assemblies while the drawing shows four.

Response:

The quantity box has been changed to reflect quantities on the drawing.

Comment 15 - Sheet X-0183-3, lower portion: The note to call out the hydrant is not shown and the length corresponding to the length of the water main to the west of the hydrant is not specified (although the length may be included in the portion of water main to the east of the hydrant).

Response:

The drawing has been changed to show the corrected length of water main.

Comment 16 - Sheet X-0183-3, lower portion: The length of 16 inch D.I. water main closest to Westwynd Drive is shown as 30 LFT, but the measured value using the scale appears to be approximately 80 LFT.

Response:

The drawing has been changed to reflect the correct length of water main.

Comment 17 - Sheet X-0183 - 6, lower portion: Along Indiana Avenue, the drawing calls out 6 inch hydrant assembly with a 90 degree bend. However, the hydrant assembly is not shown with the bend of the drawing.

Response:

The drawing has been changed to reflect the note.

Comment 18 - Sheet X-0183-8: The list of items indicated five 16 inch gate valves and boxes while there are only four 16 inch gate valves and boxes shown on the drawing.

Response:

The drawing and the list of items both indicate five 16 inch valves and boxes.

Comment 19 - Sheet X-0183-8, lower portion: At the east end of the Ash Road intersection, one of the 16 inch gate valves and boxes that is shown on this drawing is not shown on Sheet X-0183-1.

Response:

Sheet X-0183-1 has been changed to reflect sheet X-0183-8.

Comment 20 - Sheet X-0183 - 14: The 8 inch D.I. water main shown on the bottom drawing, at the eastern end, should extend beyond the match line to be consistent with other drawings.

Response:

The 8 inch D.I. water main has been extended to be consistent with other drawings.

Comment 21 - Sheet X-0183-15: The itemized list indicates four 8 inch gate valves and boxes while the drawing shows only three.

Response:

The itemized list has been changed to reflect the drawing.

Comment 22 - Sheet X-0183 - 16: At the intersection of White Street and Charles Avenue, the 8 inch valve is shown on the drawing but is not called out.

Response:

The gate valve is now called out.

Comment 23-Sheet X-0183-18: On top of the page, at the intersection of Blane Avenue and County Road 1 the 16 inch gate valve and box is called out but is not shown on the drawing.

Response:

The gate valve is shown on the drawing.

Comment 24 - Sheet X-0183-23: At the intersection of Burbank and Blane, the hydrant shown is not called out.

Response:

The drawing has been changed to note the hydrant.

Comment 25 - Sheet X-0183-25: At the intersection of Boss Boulevard and Illinois Avenue, the drawing should list the distance of D.I. water main between the 8 inch tees and the 22.5 degree bends.

Response:

The drawing has been modified to include the missing length of pipe.

Comment 26 - Sheet X-0183-29: The itemized list indicates two 6 inch hydrant assemblies, while the drawing shows three.

Response:

Only two hydrant assemblies are shown on the drawing and two are shown in the itemized list.

Comment 27 - Sheet X-0183-32: The itemized list indicates two 8 inch gate valves and boxes while the drawing shows three.

Response:

The quantity of gate valves has been changed to reflect the drawing.

Comment 28 - Sheet X-0183-36: The Section A-A should indicate the depth at which the 16 inch intake and 16 inch discharge are located.

Response:

The drawing shows the depth of the 16 inch intake and 16 inch discharge.

Comment 29 - Sheet X-0183-38: In the electrical schematic, for the 125 HP fire pump, the drawing needs to specify F.M. or U.L. type fire pump controller rated for fully locked motor amperage.

Response:

This has been added to the drawing.

March 29, 1994

(Sample Notice Letter)

Resident
Address

Re:

Dear

I am writing to you on behalf of Consolidated Rail Corporation ("Conrail"). It is our understanding that, currently, you are using a water filter system provided by Indiana Department of Environmental Management to filter water pumped from your well. As you probably know, Conrail has begun construction of an extension of the City of Elkhart water supply system that will provide your home with water service from the City. Once the water supply becomes available to your home, you should discontinue use of your well and satisfy all of your water needs from the public water supply system. Conrail further urges you to permit our contractor to seal your well to make sure that no one makes use of unfiltered well water in the future.

Once your home has been connected to the public water system, we propose to remove your filtration system. If you insist on continuing to use well water with or without the filtration system, please sign the attached form and return it to the above address. The form is a release in which you agree not to hold Conrail responsible for any harm that might result from use of well water following the availability of public water.

Please be aware that if you choose to continue to use the filtration system, it must be maintained properly in order to be effective. Enclosed is a brochure from the supplier of the system that describes the maintenance required to assure that the filter continues to operate effectively. Specific questions regarding the operation and maintenance of the system should be directed to the current supplier - North American Aqua Inc., P.O. Box 130 Vandalia, Michigan 49095 1-800-833-5553.

If you have any questions about the foregoing, please call the undersigned or Krista E. Duncan, Project Manager, Superfund Section, Office of Environmental Response, Indiana Department of Environmental Management at telephone number (317)-233-6427.

Sincerely,

enclosure

RELEASE

We have been informed by Consolidated Rail Corporation ("Conrail"), through its representatives, that a water main will be constructed adjacent to our house which will supply water from the City of Elkhart. We also have been advised that Conrail will pay all of the costs associated with connecting our home to the water supply system and, at its cost, will remove the water filtration system we are now using and will seal the water well on our property.

We understand that the United States Environmental Protection Agency and the Indiana Department of Environmental Management have concluded that it is unsafe to drink water from the well on our property unless it has been properly filtered. Conrail has informed us that if we continue to use our well and the filtration system, notwithstanding the opportunity to be connected to the public water supply system, the filtration system must be properly maintained in order to be effective. Conrail has provided us with a brochure from the supplier of the equipment explaining maintenance procedures.

After consideration of the risks of continuing to use water from our well and a review of the brochure, we have decided to retain the filtration system and continue to use water from the well on our property. We understand it is our responsibility to provide for the maintenance of the filtration system. We hereby release and fully discharge Consolidated Rail Corporation, its agents, representatives, successors and assigns, from any and all claims, damages, causes of action and liabilities of any kind, arising in any

way from our continuing to use the well on our property for drinking water purposes. We agree that we will not assert any claims against Consolidated Rail Corporation arising out of our continuing use of the well, either on our own behalf or on behalf of others.

NORTH AMERICAN AQUA, INC.
18008 State St.
Vandalia, MI 49095

WHS-400EPA

System Description

North American Aqua's two vessel activated carbon adsorption system consists of two 13 x 54 inch vessels designed to provide fifteen minutes of contact time based on an average household use of five to ten gallons per minute. This system is accompanied with a fifty micron pre-filter assembly to remove sediment and a totalizing meter to monitor gallon usage (see attached specifications). All components of this system have an NSF rating, in fact, the entire system has recently went through a multiple series of tests and evaluation by the NSF under contract by PEI Associates, Inc. of Cincinnati, Ohio for the United States Environmental Protection Agency. The results of that test program will be available soon.

The vessels in this system are arranged in series with quick couplers which allows for easy change-out of the lead unit and movement of the second vessel to the first position at the estimated time of break through. The system has no by pass there-by preventing any accidental use of contaminated water. Each vessel contains 110 lbs. of special coal based granular activated virgin 20 x 50 mesh size carbon. This carbon is selected for its high adsorption capacity on organic concentrations in water supplies (see attachments).

Along with the pre-filter and totalizing meter, the system includes pressure gauges to monitor pressure drop across the system. Additionally, the system includes sample taps located to permit sampling of influent, interim (between vessels) and treated water (effluent). The installation point (in the residents water system) of the vessels will be determined in the field on a house to house basis. Generally, the system is located at the wall head prior to softeners and conditioning units. The systems are always upstream of all water taps or other consumer use connections in each residence.

The units are installed by licensed plumbers. All plumbing will be in accordance with all applicable plumbing codes.

System Operation

The vessels will be operated in series. The lead vessel will be the gross removal unit with the second safety vessel acting as a polishing unit. As an operating parameter considering the extrapolation of isotherm tests on the average organic contaminants in the ground water, we conservatively predict the lead vessel will be depleted at 100,000 gallons or one year from start up. In the long term operation of the system, change out will be based on the gallons of water treated if the objective of 100,000 gallons is met before year end. This will be equated to (approximate) sample concentrations through sampling times as is described below.

At 100,000 gallons or at break through, whichever occurs first, the lead vessel will be removed for regeneration and replaced with a vessel of fresh carbon. This vessel of fresh carbon will be placed as the secondary vessel and the original "safety" polishing vessel will be placed in the first position. This ensures the residents a safety buffer of 100,000 gallons of usage on the undepleted fresh carbon. A one-tank filter change is done on an annual basis because of chances of bacterial growth.

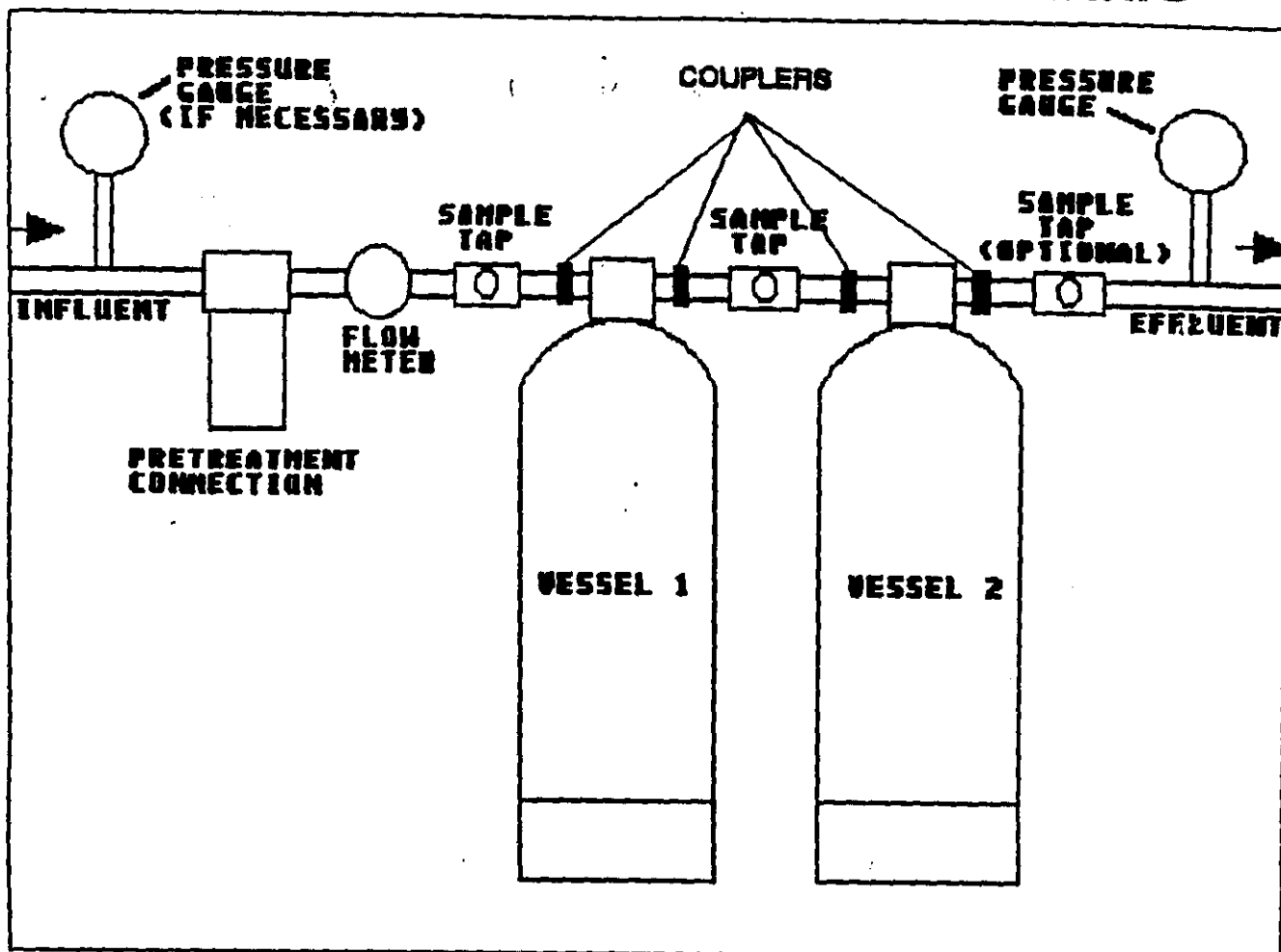
Also, included in the change outs will be the 50 micron pre-filter. Our experience shows that it is necessary to change this filter every six months or less, depending upon water conditions, to ensure maximum performance of the total system. The totalizing meter is read when the pre-filter changes are done every six months to record gallon usage, so as not to exceed 100,000 gallons of water.

System Monitoring

Monitoring of the systems shall include tracking flow rate (through the units), sampling of the inlet (influent), and interim (after first vessel). Total treated water (through both vessels) will be sampled if break through should occur prematurely at the first vessel. Please note, concentrations of organics in the influent found to be higher than in the original sampling may alter performance expectations thereby causing a possible alteration of the monitoring and the change out program. However, because of conservative estimates on carbon usage, this might not become a factor unless there is a drastic increase in organics.

Periodic testing of the system for bacterial growth, by a certified laboratory, is highly recommended. This should be done annually unless the location is in low lying areas with high aquifers, possible nearby septic systems, etc., then more frequent testing is necessary. If bacteria is found, a simple solution such as ultra-violet treatment could be utilized. Also please note that the number of gallons the system is designed to treat varies on the contaminant and its concentration.

RECOMMENDED INSTALLATION SCENARIO



INSTALLATION INSTRUCTIONS

Note To Plumbers and Users

1. System should be located upstream of all household outlets.
2. Do not expose system to freezing conditions.
3. Install on a level surface.
4. Make sure inlets and outlets are in line.
5. Use quick couplers inlet and outlet on large tanks.
6. Do not use lead solder.
7. Do not solder pipe directly connected to head.
8. Do not use where water is microbiologically unsafe or with water of unknown quality without adequate disinfection before or after the unit.

Addressing Spent Carbon

It is the policy of North American Aqua, Inc. that all spent carbon be regenerated by qualified professionals only. We have arrangements with companies licensed for this service. At the time of changeouts, North American Aqua collects and ships spent carbon to facilities where it is then cleaned by incineration.

Addressing Iron and Calcium

In areas experiencing extremely high iron and calcium content in the water supply, with analytical data our engineers can recommend a pre-treatment system that best suits your needs, such as iron removal filters, etc..

In areas with minimum iron and calcium problems, our 50 micron pleated polyester pre-filter works extremely well in collecting iron residues.

Pre-Filter Data

- * 50 pleats (674 sq. in. filtration area)
- * 50 micron nominal filtration
- * 9 3/4" long, 2 1/2" O.D.
- * 5 gpm flow rate with 2 psi drop
(40 lbs. inlet pressure)

	1.0 Introduction
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3	3.0 Permits and Approvals 3.1 City of Elkhart 3.2 Elkhart County 3.3 St. Joseph County 3.4 Permit sequence & Time Line
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7	7.0 Health and Safety Plan
8	8.0 Operation and Maintenance Plan

1.0 INTRODUCTION

This 100% Design Phase document and accompanying plans are prepared for Consolidated Rail Corporation and Groundwater Technology, Inc. This submittal includes final design drawings, project specifications, technical analysis and an updated status of permits and approvals, cost estimates, and a preliminary construction schedule. Also included are the Construction Quality Assurance Manual, Health and Safety Plan, and Operation and Maintenance Manual.

The municipal water main extension plans are submitted with this binder as a set of 24X36 inch drawings. The plans and specifications provided incorporate design changes based on United States Environmental Protection Agency and Indiana Department of Environmental Management comments on the 95% design phase as well as review requirements from the City of Elkhart and Elkhart County.

2.0 100% DESIGN FEATURES

The municipal water main design as included in this document and the associated drawings, represent an extension of the City of Elkhart municipal system. All users identified later in this report will receive service, billings and be subject to rates, as a normal water utility customer of the City of Elkhart.

Current and final routing provides for the transmission main along Indiana State Highway 219 to be located west of the line between St. Joseph and Elkhart Counties. However, this main will service users both in Elkhart and St. Joseph Counties.

Components have been added to the design which will make possible the separation of systems and customers at the county line if a St. Joseph County municipality becomes able to provide water supply to the affected users located west of the county line.

A four-way directional valve configuration is specified for a location east of S.R. 219 at Indiana Avenue allowing for separation of the system by valve closure and by the extension of an additional mains north and south along S.R. 219 east of the County Line if required. A 16" stub, plug and valve will also be extended south of Glenwood Avenue (75 feet) along S.R. 219 (west of the County line) to make future connection to a St. Joseph County Municipal extension convenient. Further, hydrant specifications and separation requirements are consistent with the City of Mishawaka specifications (the likely future water supplier) have been incorporated into the project design. All other aspects of the design specifications appear to be significantly consistent between the two water systems aside from water meter make and model which would need to be retrofitted at the time the systems are separated.

2.1 Design Documents

The following provides an overview of elements incorporated into the 100% design submittal including revisions from review by the U.S. EPA and IDEM, City of Elkhart, Elkhart County and internal design team changes.

The design documents submitted herewith also incorporate elements of the groundwater extraction system force main and discharge force main which are expected to be constructed under the same contract as the municipal water main extension. The plans for the force main and discharge force main will be submitted under a separate package included with the groundwater extraction and treatment system.

2.1.1 Design Drawings

The included project design drawings represent accurate routing and sizing of the proposed municipal water main extension and the groundwater extraction system force main and discharge force main.

The municipal water main design incorporates the basis of design developed in the 30% document, comments from the City of Elkhart, U.S. EPA and IDEM review of the 60% and 95% submittals, Ten State Standards design guidelines and Indiana Department of Environmental Management guidelines.

The extraction system force main and discharge force main are also designed utilizing information developed during the 30% document, 60% and 95% design phase, Ten States Standards for waste water systems and I.D.E.M. guidelines. Design drawings for these improvements will be submitted separately with the groundwater extraction system.

Routing of the municipal water main extension continues to generally avoid existing utilities by utilizing the opposite treelawn wherever possible. Most utility conflicts have been resolved. However, some alignment changes may be required during construction. The proposed location of the fire pump station as included in the plans is the best location available but may still be dependent upon land acquisition.

The water main design does not require profile views for permit applications with the I.D.E.M. drinking water branch. However, as the groundwater extraction will be permitted as a waste water transmission system through the Facility Construction Section of the Office of Water Management, profiles are required. Conflicts where these utilities cross have been identified and are clearly noted with separation requirements shown on the force main profile view.

Construction details are included for both systems and may be added to as the project proceeds towards construction.

2.1.2 Project Specifications

The included specifications provide instructions to bidders, general conditions, schedule of drawings, general specifications, project specifications, sample contract, proposal section and sample bond forms. The project specifications also incorporate elements of the 30%, 60% and 96% design, City of Elkhart design criteria and standard specifications and review as well as I.N.D.O.T. standard references, AWWA standard references, manufactures specifications, Ten States Standards design guidelines and Indiana Department of Environmental Management guidelines.

The specifications provide details for both the municipal water main extension and the force main improvements associated with the groundwater extraction system. It is expected that both improvements will be constructed under one contract.

CONSOLIDATED RAIL CORPORATION

2001 MARKET STREET
PHILADELPHIA, PA

Project Specifications

Conrail-Elkhart Yard Municipal

Water Main Extension

And

Groundwater Extraction System Force Main

& Discharge Force Main

March, 1994

As Prepared By:

Wightman Petrie, Inc.
2340 Cassopolis Street
Elkhart, IN 46514
Telephone: 219-264-4587

CONSOLIDATED RAIL CORPORATION
2001 MARKET STREET
PHILADELPHIA, PA 19101-1403

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PART 1

REQUEST FOR BID

OWNER'S NAME: Consolidated Rail Corporation
2001 Market Street
Philadelphia, PA 19101

PROJECT NAME: Conrail Elkhart Yard Municipal Water Main Extension

The Owner will receive sealed bids for the Conrail Railroad Site Water Main Extension Project until _____, Local Time, on the _____ day of _____, _____ at the _____ at which time and place all bids will be publicly opened and read aloud.

The work for which bids are being requested includes:

6",8",10",12" & 16" Ductile Iron Water Main, fittings, valves hydrants and all appurtenant equipment, removal & restoration thereto. 6", 8" and 12" Ductile Iron Groundwater Extraction System Force Main, fitting, valves and all appurtenance equipment, removal and restoration thereto.

The contract documents, including plans and specifications may be obtained at the office of the Engineer, Wightman Petrie Inc. 2340 Cassopolis Street, Elkhart, Indiana, 46514, Neither the Owner nor the Engineer will be responsible for partial sets of documents obtained from any other source.

The Owner reserves the right to reject any or all bids and to waive any irregularities in bidding.

A certified check or bank draft drawn on a solvent bank in the State of Indiana payable without condition to the Owner or a satisfactory bid bond executed by the bidder and a surety company, in an amount equal to 5 percent of the bid shall be submitted with each bid.

No bids may be withdrawn after the scheduled closing time for receipt of bids for at least thirty (30) days.

The successful bidder will be required to furnish a satisfactory Performance and Labor and Material bond in the amount of 100 percent of the contract price. Bond forms are included in the contract documents. The successful bidder will also be required to provide bonds as related to work within county and state right of ways the amount of which will be determined by the respective agency.

PART 2
INSTRUCTIONS TO BIDDERS

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PART 2
INSTRUCTIONS TO BIDDERS

1. PREPARATION OF PROPOSAL

Each proposal shall be firmly sealed in an envelope which is clearly labeled Conrail-Elkhart Yard Municipal Water Main Extension and delivered to the office designated in the Advertisement for Bids. All bids are to be made only on forms of proposal furnished by the Owner and included in this volume. Only proposals which are made out upon the regular proposal forms attached hereto, will be considered. The proposal forms must not be separated from the attached volume. The Owner may consider as informal any proposal on which there is an alteration of or departure from the prescribed form. Any unauthorized riders or qualifications to the bid as submitted may be rejected as irregular.

The proposals must be legibly written in ink, with all prices given in words and figures, as required by the proposal form. In case of discrepancy between the written words and the figures, the written words shall govern. In case of unit price proposals, the bidder shall fill in the unit price bid for each item and, in addition thereto, make an extension based on the estimated quantities. In case of incorrect totaling of amounts or where the unit bid price and the extension do not agree, the unit bid price shall in all cases govern in arriving at the correct extension and/or total for the purpose of comparing bids.

2. BID SECURITY

No proposal will be received unless accompanied by a certified check or bank draft or a satisfactory bid bond executed by the bidder and a Surety Company, in an amount not less than five (5) percent of the total bid, payable to the Owner as a guarantee that if the bid is accepted, the bidder will execute and file the proposed contract and bond within ten (10) days from the date of the award of the contract. On failure of the successful bidder to execute the contract and file the required bonds and insurance within the required time, he shall forfeit his bid security as agreed as liquidated damages. By filing a proposal, all bidders agree to and accept this provision.

The bid securities of the three lowest formal bidders for each contract will be held until the contract is executed and approved. Following execution and approval of the contract these three bid securities will be returned to the respective bidders. The bid securities of all but the three lowest formal bidders as described above, will be returned within three (3) days after the opening of the bids.

3. LIQUIDATED DAMAGES

The owner is subject to an administrative order issued by U.S. E.P.A.. E.P.A. may seek significant penalties for work not completed by mandated deadlines. The requirements of this order will also apply to all contractors and subcontractors working on the project. Accordingly, the following penalties will be enforced.

Failure to completely finish the whole of the specified work within the number of calendar days specified for completing all the work of the contract, including extensions granted subject to the provisions of Article 19 of the General Conditions, shall entitle the owner to deduct from the moneys due the contractor as "Liquidated Damages" and not as a penalty, the sum of \$500.00 per day for each and every calendar day of delay in completion of the work.

Further and in addition to the above referenced liquidated damages, if it is found that non-completion by the specified date or granted extensions thereto is a result of the actions or inactions of the contractor, all of the penalties assessed against the owner shall be payable by the contractor. These funds may be retained or deducted from requested interim pay estimates or final pay requests at the Owner's option.

4. EXAMINATION OF SITE AND SPECIFICATIONS

At the time of opening bids, each bidder will be presumed to have made a personal investigation of the site of the work and of existing structures and to have read and be thoroughly familiar with the plans, specifications, and contract documents (including all addenda). He shall determine to his own satisfaction the conditions to be encountered, the nature of the ground, difficulties involved in completing the contract and all factors affecting the work proposed under this contract.

The bidder to whom this contract is awarded will not be entitled to any additional compensation by reason of his failure to fully acquaint himself with the conditions at the site or by his failure to fully examine the plans, specifications, and contract documents.

5. INTERPRETATION OF PROPOSED CONTRACT DOCUMENTS

If any person contemplating submitting a bid for this contract is in doubt as to the true meaning of any part of the plans, specifications, or other proposed contract documents, he may submit to the Owner a written request for an interpretation thereof. The person submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by addendum duly issued or delivered to each person receiving a set of such documents. The Owner will not be responsible for any other explanations or interpretations of the proposed documents.

6. QUALIFICATIONS OF BIDDER

The Owner shall have the right to take such steps as it deems necessary to determine the ability of the bidder to perform the work and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The right is reserved to reject any bid where an investigation of the evidence or information submitted by such bidder does not satisfy the Owner that the bidder is qualified to carry out properly the terms of the contract documents.

7. APPROXIMATE QUANTITIES

In cases where any part or all of the bidding is to be received on a unit price basis, the quantities stated are not intended to govern. The quantities stated, on which unit prices are so invited are approximate only and each bidder will be required to make his own estimates of amounts, and to calculate his unit price bid accordingly. Bids will be compared on the basis of the stated number of units in the proposal form. Such estimated quantities while made from the best information available are approximate only. Payment on the contract will be based on actual number of units installed on the completed work.

8. STANDARD MANUFACTURER

Wherever the terms "standard", "recognized", or "reputable" manufacturer are used, they shall be construed as meaning manufacturers who have been engaged in the business of fabricating materials, equipment, or supplies of the nature called for by the specifications for a reasonable period of time prior to the date set for opening of bids, and who can demonstrate to the satisfaction of the Owner that said manufacturer has successfully installed in at least three instances and that the performance of such materials, equipment, or supplies has been satisfactory. Manufacturers who have been engaged in the business of manufacturing said materials, equipment, or supplies for a period of over twelve months prior to the date fixed for opening bids shall, prima facie, be deemed to have been engaged in such business for a reasonable length of time.

9. SOIL BORINGS

Bidders shall make whatever borings necessary to fully acquaint themselves with conditions as they exist so that they may fully understand the conditions which may affect the cost of the work. Failure to make such borings or any borings made which do not provide a complete understanding of the conditions encountered shall not relieve the Contractor of the responsibility for carrying out all the work to completion as shown on the plans, or as specified, at the price specified to be paid for the work. Where the results of any test borings are shown on the plans, the information is not guaranteed and the Contractor must satisfy himself as to the character of materials that may be encountered.

10. SIGNING OF BIDS

Bids which are not signed by the individual making them shall have attached thereto a power of attorney evidencing authority to sign the bid in the name of the person for whom it is signed.

Bids which are signed by a partnership shall be signed by all of the partners or by an attorney-in-fact. If signed by an attorney-in-fact, there shall be attached to the bid a power of attorney evidencing authority to sign the bid, executed by the partners.

Bids which are signed for a corporation shall have the correct corporate name thereof and the signature of the president or other authorized officers of the corporation manually written below the corporate name following the word "by". If such a bid is manually signed by an officer other than the president of the corporation, a certified copy of a resolution of the board of directors evidencing the authority of such official to sign the bid shall be attached to it. Such a bid shall also bear the attested signature of the secretary of the corporation and the impression of the corporate seal.

11. AWARD OF CONTRACT

An award of contract will be made, in accordance with the applicable stipulations in the proposal to the lowest responsible bidder, whose proposal complies with all the requirements prescribed, provided his bid is reasonable and it is to the interest of the Owner to accept it. The bidder to whom the award is made will be notified at the earliest possible date. The Owner reserves the right to reject any and all bids and to waive any informality in bids received whenever such rejection or waiver is in the interest of the Owner.

When so stipulated in the proposal form, the Owner may elect to make a tentative award of contract pending the sale of bonds or the completion of other financing arrangements. In such event, and upon successful completion of the necessary arrangements to finance the cost of the project, the Owner and the successful bidder to whom the tentative award has been made shall enter into a written contract at the price stated in the proposal and as specified, provided that the elapsed time from the date of the tentative award shall not exceed the period set forth in the proposal form. The time for execution of the written contract may be extended beyond the period set forth in the proposal, if such extension is mutually agreeable to the Owner and the successful bidder.

12. EXECUTION OF AGREEMENT

The bidder to whom an award is made will be required to enter into a written agreement in the form hereto annexed within ten (10) days (Sundays and legal holidays excepted) after being notified of the acceptance of his bid and receipt by him of the copies of the documents to be executed. In case of failure to comply with this

requirement, he may be considered to have abandoned all his rights and interests in the award, and his certified check or amount of bidder's bond may be declared to be forfeited to the Owner and the contract may be awarded to another. Each contract must be executed in three (3) original counter parts and no more, and there shall be executed original counter parts of the Contractor's performance bond in equal number to the executed original counterparts of the contract. Two copies of such executed documents will be retained by the Owner, the third will be delivered to the Contractor.

13. EFFECTIVE DATE OF CONTRACT AWARD

Subject to the applicable provisions of law, this contract shall be in full force and effect as a contract from and after the date when formal notice of such award signed by the authorized representative of the Owner has been delivered to the intended awardee, or mailed to him at the main business address shown in his proposal by some officer or agent of the Owner duly authorized to give such notice.

14. DISQUALIFICATION OF BIDDERS

More than one proposal for the work described in this document, to be included under a contract, from an individual, firm, or partnership, a corporation or an association under the same or different names, will not be considered. Reasonable grounds for believing that any bidder is interested in more than one proposal for the work contemplated will cause the rejection of all proposals in which such bidder is interested. If there is reasonable grounds for believing that any member, representative, or agent of any bidder entered into any combination, collusion, or agreement with any other bidder or attempted to prevent anyone from bidding or attempted to induce anyone to refrain from bidding in any way or manner whatever, the proposals of the participants in such activities will not be considered.

15. PENALTY FOR COLLUSION

If at any time it shall be found that any member, representative, or agent of the person, firm or corporation to whom the contract has been awarded has in presenting any bid or bids entered into any combination, collusion, or agreement with any person relative to the price to be bid by anyone, or attempted to prevent any person from bidding, or attempted to induce anyone to refrain from bidding or if the bid was made with reference to any other bid or with any agreement, understanding, or combination with anyone in reference to the letting of such contract in any way or manner whatever, then the contract so awarded shall be null and void, and the Contractor and his sureties shall be liable to the Owner for all loss or damage which the Owner may suffer thereby, and the Owner may advertise anew for bids for said work.

16. PERFORMANCE BOND AND LABOR AND MATERIAL BOND

The successful bidder shall furnish a Performance Bond and a Labor and Material Bond in a penal sum of at least 100 percent of the total amount payable by the terms of the contract. Such bond shall be in the form of bond, a copy of which is included in the contract documents. Such Performance Bond and Labor and Material Bonds shall be furnished and executed and delivered by the successful bidder to the Owner within ten (10) days after the receipt by the successful bidder of the contract forms and notification that the Owner is in a position to enter into a signed contract.

PART 3
GENERAL CONDITIONS

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PART 3
GENERAL CONDITIONS

1. DEFINITIONS

Wherever used in any of the contract documents, the following meaning shall be given to the term herein defined:

- A. Contractor - The person, firm or corporation to whom the within contract is awarded by the Owner and who is subject to the terms thereof.
- B. Subcontractor - A person, firm or corporation, other than the Contractor, supplying labor and materials or labor for work at the site of the project.
- C. Project - The entire improvement proposed by the Owner to be constructed in part or in whole pursuant to the within contract.
- D. Work - The work to be done, including all labor, materials, tools, and all appliances and appurtenances necessary to perform and complete everything specified or implied in the plans or in this contract, in full compliance with all the terms and conditions thereof.
- E. Owner - Consolidated Rail Corporation
- F. Engineer - The engineer, engineering firm, or corporation as specified in the Request for Bids who are designated by the Owner for the work, or their duly authorized agents, such agents acting severally within the scope of the particular duties entrusted to them.

The engineer of record representing the owner in regard to the U.S. E.P.A. order is:

Groundwater Technology Inc.
3 Edgewater Drive
Norwood, MA 02062

The engineer providing design in regard to this project is

Wightman Petrie, Inc
2340 Cassopolis Street
Elkhart, IN 46514

- G. Contract Documents or Contract - All of the component parts of the contract including the Request for Bids, Instructions to Bidders, General Conditions, General Specifications, Project Specifications, Proposal, Contract Bonds, all of which are attached hereto; and including any Addenda which may be issued and made a part of the Contract; and the plans and drawings therein referred to and other drawings, specifications, and engineering data which may be furnished by the Contractor and approved by the Owner, and such additional specifications and drawings which may be furnished by the Engineer from time to time as are necessary to make clear, and to define in greater detail the intent of the specifications and plans.

2. INTENT OF THE CONTRACT DOCUMENTS

The contract documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the contract documents is to include in the contract price the cost of all labor and materials, water, fuel, tools, plant, equipment, light, transportation, and all other expenses as may be necessary for the proper execution of the work.

In interpreting the contract documents, words describing work or materials which have a well-known technical or trade meaning, unless otherwise specifically defined in the contract documents, shall be construed in accordance with such well-known meaning recognized by architects, engineers, and the trade.

3. PLANS AND SPECIFICATIONS

The location of the work, together with the details for the construction of the various structures, is shown upon the set of plans specified in PART 4, SCHEDULE OF DRAWINGS.

These plans together with the Specifications form a part of the contract. Where dimensions are shown on the drawings, they shall take precedence over scaled distances and dimensions.

In the event of any discrepancy between the plans and the specifications, the decision of the Engineer shall be decisive thereon. The figured dimensions on the plans are to be taken as correct, but the Contractor is required to carefully check all dimensions of structures before beginning work thereon. Should any errors be discovered, the Engineer's attention shall be called to the same, and the proper corrections made. All notes on the plans shall be carefully observed by the Contractor and are to be made a part of the Contract.

Before ordering any materials or equipment, but in ample time to permit the satisfactory progress of the work, the Contractor shall submit to the Engineer for approval additional drawings or prints, in triplicate, of the equipment included under his contract, together with the information in such detail as may be necessary to permit the Engineer to inform himself of the design of the equipment and the character of the various materials which the Contractor proposed to use. Wherever the installation of various materials or equipment are dependent one upon the other for determination of measurements or fit of parts, the drawings of such items shall be submitted at approximately the same time to permit proper checking by the Engineer.

The Contractor shall make such change in the above drawings as may be found necessary upon inspection by the Engineer to make the same conform to the specifications, or to the layout, at his own expense. Prior to the acceptance of any such drawings any work which the Contractor may do on the equipment covered by the same shall be at his own risk, as the Owner will not be responsible for any expense incurred by the Contractor in changing equipment to make the same conform to the drawings as finally approved.

Of the minor equipment for which drawings may not be required, the Contractor shall furnish to the Engineer tabulated lists, from time to time, showing the name of the manufacturer and the catalog number of the type of equipment proposed, together with such prints, dimensions, specifications, samples, or other data as may be required to permit intelligent judgment of the acceptability of the equipment and materials proposed.

Upon approval of the above drawings, lists, prints, samples, and other data, the same shall become a part of this contract, and the equipment furnished shall be in conformance with the same, provided that the approval of the above drawings, lists, prints, specifications, samples or other data shall in no way release the Contractor from the responsibility for the proper fulfillment by any equipment of the requirements of this contract and of the purpose for which said equipment is installed nor from his liability to replace the same should it prove defective or fail to meet the specified requirements.

The Contractor shall check all dimensions and quantities on the drawings furnished by the Owner or by himself and shall notify the Engineer of all errors or omissions which he may discover by examining and checking the same. He will not be allowed to take advantage of any error or omission in the drawings, as full instructions will be furnished by the Engineer, should such error or omission be discovered, and the Contractor shall carry out such instructions as if originally specified.

4. MATERIALS AND WORKMANSHIP

Unless otherwise stipulated in the specifications, all workmanship, equipment, materials, and articles incorporated in the work covered by this contract are to be new and of the best grade of their respective kinds for the purpose. The Contractor shall,

if required, furnish such evidence as to kind and quality of materials. The Contractor shall furnish to the Owner, for his approval, the name of the manufacturer of machinery, mechanical, and other equipment, which he contemplates installing together with their performance capacities and other pertinent information.

If not provided, material or work called for in this contract shall be furnished and performed in accordance with well-known, established practice and standards recognized by architects, engineers, and the trade.

When required by the specifications, or when called for by the Owner, the Contractor shall furnish the Owner for approval, full information concerning the materials or articles which he contemplates incorporating in the work. Samples of materials shall be submitted for approval when so directed. Machinery, equipment, materials, and articles installed or used without such acceptance shall be at the risk of subsequent rejection.

5. ROYALTIES AND PATENTS

The Contractor shall pay for all royalties and patents and shall defend all suits or claims for infringement on any patent right, and shall save the Owner harmless from loss on account thereof.

6. PERMITS AND COMPLIANCE WITH LAWS

The Contractor shall pay for all permits and licenses necessary for the prosecution of the work unless otherwise specifically provided.

The contractor shall provide applicable right of way permit bonds to Elkhart County, St. Joseph county and the State of Indiana for work performed within the respective public rights of way.

The Contractor shall give all notices, pay all fees, and comply with all the federal, state, and local laws, ordinances, rules, and regulations bearing on the conduct of the work.

7. INSPECTION

The Owner and its representative shall at all times have access to the work wherever it is in preparation or progress and the Contractor shall provide proper facilities for such access for inspection.

The Engineer shall have the right to reject materials and workmanship which are defective, or require their correction. Rejected workmanship shall be satisfactorily corrected, and rejected materials shall be removed from the premises without charge

to the Owner. If the Contractor does not correct such condemned work and remove rejected materials within a reasonable time, fixed by written notice, the Owner may remove them and charge the expense to the Contractor.

If any defects or omissions in said work are hidden or concealed so that a reasonably careful inspection at the time of acceptance of said work would not have disclosed them, and such defects or omissions appear or are disclosed within one year following the date of the approval by the Owner of the final estimate, then said Contractor agrees, on notice given him in writing by the Engineer, that such defects or omissions exist, to correct immediately and make good the same; and in the event that he fails, refuses, or neglects to do so, then said Owner may correct and make good the same, and said Contractor hereby agrees to pay on demand the cost and expense of doing such work.

8. COOPERATION

The Contractor shall cooperate with all other contractors who may be performing work on behalf of the Owner and workmen who may be employed by the Owner on any work in the vicinity of the work to be done under this contract, and he shall so conduct his operations as to interfere to the least possible extent with the work of such contractors or workmen. He shall promptly make good, at his own expense, any injury or damage that may be sustained by other contractors or employees of the Owner at his hands. Any difference or conflict which may arise between the Contractor and other contractors, or between the Contractor and the workmen of the Owner, in regard to their work shall be adjusted and determined by the Engineer. If the work of the contractor is delayed because of any acts or omissions of any other contractor or the Owner, the Contractor shall have no claim against the Owner on that account other than for an extension of time.

When two or more contracts are being executed at one time in such manner that work on one contract may interfere with that on another, the Engineer shall decide which contractor shall cease work and which shall continue, or whether the work on both contracts shall progress at the same time and in what manner.

9. RESPONSIBILITY OF CONTRACTOR

The Contractor shall build, construct, finish, and fully complete the whole of the work in the manner described and shown in the contract drawings and specifications and in accordance with such further details and instructions as the Engineer may from time to time furnish or issue for the purpose of insuring the thorough completion of the work in the most efficient manner.

The Contractor shall be responsible for the entire work until completed and accepted by the Owner.

The Owner is not to be held responsible for the estimates of the quantities of materials to be furnished or work to be done. The Contractor must judge for himself as to such estimates, as well as to conditions to be met which will affect both the cost and time required for the execution of the work and he assumes all responsibility therefore.

The Contractor shall be required to give his personal attention to the fulfillment of this contract and the execution of the work. He shall keep the same under his control and shall not sublet any part of it, except as hereinafter specified. The Owner will not recognize any parties engaged in the work embraced by this contract other than the Contractor and his employees.

The Contractor shall not assign, by power of attorney or otherwise, any portion of the money that may become due through the performance of this contract or any part thereof without the written permission of the Owner.

10. SUBCONTRACTS

The Contractor shall notify the Owner in writing of the names of the subcontractors proposed for the principal parts of the work, and shall not employ any subcontractors that the Owner objects to as incompetent or unfit.

The Contractor agrees to be fully responsible to the Owner for the acts or omissions of his subcontractors and of anyone employed directly or indirectly by him or them and this contract obligation shall be in addition to the liability imposed by law upon the Contractor.

Nothing contained in the contract documents shall create any contractual relationship between any subcontractor and the Owner.

The Contractor agrees to bind every subcontractor (and every subcontractor of a subcontractor) and every subcontractor agrees to be bound by the terms of this Contract, Plans and Specifications, as far as applicable to his work, unless specifically noted to the contrary in a subcontract approved in writing as adequate by the Owner.

11. CHATTEL MORTGAGES

No materials or supplies for the work shall be purchased by the Contractor or by any subcontractor subject to any chattel mortgage or under a conditional sale or any other agreement by which an interest is retained by the seller. The Contractor warrants that he will have good title to all materials and supplies used by him in the work.

12. DAMAGES

To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Groundwater Technology Inc. and Wightman Petrie, Inc., the City of Elkhart and Elkhart County and their agents and employees from and against all claims, damages, losses and expenses, including but not limited to, attorney fees arising out of or resulting from the performance of the work provided that any such claim, damage, loss, injury or expense is attributable to bodily injury, sickness, disease or death, or to injury or destruction of tangible property, other than the work itself (including the loss of use resulting therefrom), and is caused in whole or in part by any negligent act or omission of the Contractor, any subcontractor, anyone directly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. The said Contractor further agrees that so much of the money due to him under and by virtue of this contract, as shall be considered necessary by the Owner, may be retained by the Owner to protect itself against loss until such suit or claims for damages shall have been settled, and evidence to that effect shall have been furnished to the satisfaction of the said Owner.

13. WORKMEN'S COMPENSATION

The Contractor shall procure and shall maintain during the life of this contract Workmen's Compensation Insurance for all of his employees to be engaged in work on the project under this contract and, in case any such work is sublet, the Contractor shall require the subcontractor similarly to provide workmen's compensation insurance. In case any class of employees engaged in hazardous work under this contract is not protected under the workmen's compensation statute, the Contractor shall provide and shall cause each subcontractor to provide adequate insurance coverage for the protection of such of his employees not otherwise protected.

14. PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE

The Contractor shall take out and maintain during the life of this contract such Public Liability and Property Damage Insurance as shall protect him from claims for personal injury, including accidental death, as well as from claims for property damages, which may arise from operations under this contract, whether such operations be by himself or by anyone directly or indirectly employed by him. The Contractor shall require all subcontractors similarly to provide Public Liability and Property Damage Insurance including the same conditions. The minimum amounts of such insurance shall be as follows:

1. Contractor's Liability Insurance

Bodily Injury

\$500,000.00

Property Damage		\$500,000.00
2. Automobile Insurance		
Bodily Injury -	Each Person	\$500,000.00
	Each Accident	\$500,000.00
Property Damage -	Each Accident	\$500,000.00
3. Umbrella Policy	\$1,000,000.00	

15. ESTIMATED QUANTITIES

The Contractor agrees that the quantities of the various classes of work as stated in the proposal or indicated on the plans are only approximate and are to be used solely for the purpose of comparing bids offered for the work. During the progress of the work, the Owner may find it advisable, and shall have the right to omit portions of the work and to increase or decrease the quantities, and that the Owner reserves the right to add or take from any item as may be deemed necessary or desirable. Under no circumstances or conditions will the Contractor be paid anything on account of anticipated profits upon the work, or any portion thereof covered by this contract, which is not actually performed or entered into the construction of said improvements.

16. CHANGES IN WORK

The Owner reserves the right to make any changes in the specifications and plans which may be deemed necessary either before or after beginning any work under this contract without invalidating it provided that if alterations are made, the general character of the work as a whole is not changed thereby.

If such alterations increase the quantity of work to be done where unit prices are specified, such increase shall be paid for according to the quantity of work actually performed at the unit price specified under this contract for each designated class of work. If such alterations diminish the quantity of work to be performed where unit prices are specified, they shall not constitute a claim for damages or for loss of profits on the work that may be dispensed with, and the Owner shall not be required to pay for work or materials omitted.

If such alterations increase or decrease the amount of work to be done where lump sum prices are specified, such increase or decrease shall be determined by one or more of the following methods, as determined by the Engineer.

- A. By an acceptable lump sum proposal from the Contractor for all or such part of the work or materials as not specified in the contract by applicable unit prices.

B. By an acceptable unit price proposal from the Contractor for such items of work or materials as not already specified in the contract by applicable unit prices.

C. On a cost-plus limited basis not to exceed a specified limit. A cost-plus limited basis is defined as the cost of labor plus fifteen (15) percent of the said cost to cover superintendence, general expense, and profit.

If such alteration or omissions diminish the amount of the work to be done where lump sum prices are specified, such alterations or omissions shall not constitute a claim for damages or for loss of profits on the work or material omitted. The Contractor shall allow a credit for all work or materials omitted.

Changes shall be made only upon the order of the Owner, and such order shall be of no effect until the price or prices for the work or materials not covered by bid prices has been agreed upon in writing and signed by the Contractor and said Owner, and said Contractor shall not be allowed to recover anything for work performed or materials used by reason of any change of this contract unless an order is made and agreement signed as aforesaid; nor shall the Contractor in any case be allowed to recover more for such work and materials than said agreed price.

If the Owner and Contractor cannot agree upon the prices to be paid for additional work not provided in this contract, then it is agreed that the Owner shall have the right to contract with any person or persons for its performance.

17. PROGRESS SCHEDULE

The Contractor, immediately after being awarded the contract, shall prepare and submit one copy each to the Owner and the Engineer, a proposed schedule of progress, preferably in graphic form indicating the separate portions of the work to be performed under this contract and the date of beginning and completing each. On the 25th day of each calendar month, two (2) copies of the schedule shall be submitted to the Engineer with notes thereon indicating the percentage of completion of each separate portion of the work on that date. The form of the schedule shall be approved by the Engineer.

18. MONTHLY PROGRESS MEETING AND REPORT

On the 25th of each month, the contractor or contractors supervisor which ever is in responsible charge of the work shall attend a progress meeting and submit the monthly progress schedule as required in Section 17. The contractor shall also submit a monthly report providing descriptions of work completed, difficulties encountered, changes in conditions, or other details which may be pertinent to the project construction schedule.

19. NOTICE TO SUSPEND WORK

The Contractor shall delay or suspend the progress of the work or any part thereof whenever he shall be so required by written order of the Engineer and for such periods of time as the Engineer may order providing that, in the event of such delay or delays or of such suspensions of the progress of the work, or any part thereof, the time for the completion of the work so suspended or of work delayed by such suspension or suspensions shall be extended for a period equivalent to the time lost by reason of such suspension or suspensions, except when the Contractor is notified to suspend work on account of faulty construction or construction methods that endanger the work, but such order of the Engineer shall not otherwise modify or invalidate in any way any of the provisions of this contract, and said Contractor shall not be entitled to any damage or compensation from the Owner on account of such delay or delays, suspension or suspensions, except as provided herein under the heading, "UNAVOIDABLE DELAYS AND EXTENSION OF TIME".

20. UNAVOIDABLE DELAYS AND EXTENSION OF TIME

In the event that any material alterations or additions are made as herein specified, which, in the opinion of the Engineer will require additional time for the execution of any work under this contract, then, in that case, the time of completion of the work shall be extended by such period of time as may be fixed by said Engineer and his decision shall be final and binding upon both parties hereto provided that, in such case, the Contractor, within four days after being notified in writing of such alterations or additions, shall request in writing an extension of time, but no such extensions of time shall be given for any minor alterations or additions, and the provisions herein shall not otherwise alter, change, or invalidate the provisions of this contract with reference to Liquidated Damages, and the said Contractor shall not be entitled to any damage or compensation from the said Owner on account of such additional time required for the execution of the work.

Should the Contractor be obstructed or delayed in the commencement, prosecution, or completion of any part of said work by any act or delay of the Owner, or by any act or delay of a commercial carrier in transporting equipment, material, or appurtenances for said work, or by riot, insurrection, war, pestilence, fire, lightning, earthquakes, cyclones, floods, or through any default or delay of other parties under contract with said Owner, or through strikes or other causes, which causes of delay mentioned in this article, in the opinion of the Engineer, are entirely beyond the control of the Contractor, then the time herein fixed for the completion of the work so delayed will be extended for a period equivalent to the time lost by reason of any of the causes aforesaid, but no such allowance will be made unless a claim for extension of time is made by the Contractor to the Owner in writing within one week from the time when any such alleged cause for delay shall occur.

It is further expressly agreed that said Contractor shall not be entitled to any damages or compensation from said Owner on account of any delays resulting from any of the causes specified herein, except compensation for wages for extra time for any necessary watchmen and for extra premiums on his bond actually paid by said Contractor on account of said additional time so required to complete all work hereunder due only to delays caused by the Owner or by other parties under contract with said Owner. The Engineer shall decide the number of days that said Contractor has been so delayed and his decision shall be final and binding upon both parties hereto.

21. TERMINATION FOR BREACH

In the event that any of the provisions of this contract are violated by the Contractor or by any of his subcontractors, the Owner may serve written notice upon the Contractor and the Surety of his intention to terminate such contract, such notice to contain the reasons for such intention to terminate the contract, and unless within ten (10) days after the service of such notice upon the Contractor, such violation shall cease and satisfactory arrangements for correction are made, the contract shall upon the expiration of said ten (10) days, cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the Surety and the Contractor, and the Surety shall have the right to take over and perform the contract. Provided, however, that if the Surety does not commence performance thereof within thirty (30) days from the date of the mailing to such Surety of notice of termination, the Owner may take over the work and prosecute the same to completion by contract for the account and at the expense of the Contractor, and the Contractor and his Surety shall be liable to the Owner for any excess cost occasioned the Owner thereby, and in such event the Owner may take possession of and utilize in completing the work, such materials, appliances, and plans as may be on the site of the work and necessary therefore.

22. COST OF WORK

The Contractor shall furnish the Engineer reasonable facilities for obtaining such information as he may desire respecting the progress and execution of the work and the character of materials. The Contractor, upon request, shall furnish the Engineer with copies of expense bills for transportation charges, materials, and equipment. In the event of cost-plus-limited work as authorized in writing by the Engineer, the Contractor shall submit daily payrolls and equipment rental charges in addition to cost of materials.

When required by the Engineer, the Contractor shall furnish a supplemental schedule of prices showing breakdown of cost of lump sum price items.

23. GUARANTEE

The Contractor hereby guarantees all of the work furnished under this contract against any defects in workmanship or materials for a period of one (1) year following

the date of the approval of the Owner of the final estimate. Under this guarantee, the Contractor agrees to make good without delay at his own expense any failure of any such parts due to faulty materials, construction, or installation, or to the failure of any such equipment to successfully perform all the work put upon it within the limits of the specifications and further shall make good any damage to any part of the work caused by such failure. Said Contractor also agrees that the Contractor's Performance Bond shall fully cover all guarantees contained in this paragraph.

24. ENGINEER TO DECIDE

All work performed under this contract shall be done in a first class, workmanlike manner, and done to the satisfaction of the Engineer. The Engineer shall in all cases determine the amount, quality, acceptability, and fitness of the several kinds of work and materials herein specified. He shall decide all questions which may arise as to the fulfillment of the terms of the contract by the Contractor, or as to the intent or purpose of the contract, and his decision on any questions that may arise shall be final and conclusive as to both parties of this contract, and his approval of the work shall be a condition precedent to the final settlement and payment of any amount which may be due the Contractor.

25. DUTIES AND POWERS

Properly authorized inspectors shall be considered to be the representatives of the Engineer limited to the duties and powers entrusted to them. It shall be their duty to inspect the materials and workmanship of those portions of the work to which they are assigned, either individually or collectively, under instructions of the Engineer and to report any and all deviations from the plans, specifications, and other contract provisions which may come to their notice. Any inspector shall have the right to order the work entrusted to his supervision stopped if, in his opinion, such action becomes necessary until the Engineer is notified, and he has determined and ordered that the work shall proceed in due fulfillment of all contract requirements.

26. NO WAIVER OF RIGHTS

Neither the inspection by the Owner or Engineer or any of their employees, nor any order by the Owner for payment of money, nor any payment for, or acceptance of, the whole or any part of the work by the Owner or Engineer, nor any extension of time, nor any possession taken by the Owner or its employees, shall operate as a waiver of any provision of this contract, or of any Power herein reserved to the Owner, or any right to damage herein provided, nor shall any waiver of any breach in this contract be held to be a waiver of any other or subsequent breach.

27. NIGHT, WEEKEND, OR HOLIDAY WORK

It is the intent of these contract documents that all work contemplated for this project is to be performed on a five day work week utilizing eight hour work days. The Contractor should note that the completion time specified is in calendar days figured from a seven day calendar week. Whenever the Contractor wishes to perform work at night or on weekends or holidays, or to vary the period of hours during which work is carried on each day, he shall give written notice to the Engineer at least forty- eight (48) hours in advance so that proper inspection may be furnished in writing by the Engineer, and no extra compensation shall be allowed the Contractor. In the event that the Contractor chooses to perform work on Saturdays, Sundays, or holidays during the term of this contract, the Owner shall charge the Contractor, as "Liquidated Damages", the sum of \$30.00 per hour actually worked on a Saturday, Sunday, or holiday. Said liquidated damages shall be deducted from the Contractor's contract each month by the Owner and shall be utilized to pay the additional expenses involved in providing proper inspection.

Be advised that to complete the associated private water service connections, which are an integral part of the project plans, it is likely that after hours or weekend work may be necessary to accommodate private property owners with conflicting work schedules. Where weekend or after hours work requires inspection by the ENGINEER, associated extra costs shall be the responsibility of the owner (Conrail).

28. BONDS

The successful bidder will be required to furnish for each set of executed Contract Documents and conformed copies thereof an original conformed Performance Bond and Labor and Material Bond on the forms attached hereto with surety acceptable to the Owner as follows:

1. Bond in the amount of 100 percent of the contract price to insure the completion of the entire work according to the contract.
2. Bond in the amount of 100 percent of the contract price for the protection of the Owner and to secure payment of all subcontractors, labor and material men according to the statutes of the State of Indiana at that time in effect.

29. PRICES

The Contractor agrees to accept the prices stated in the proposal form hereto attached as full compensation for furnishing all of the equipment and materials, and for doing all the work contemplated and specified in this Contract; also for all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstructions or difficulties which may be encountered

in the prosecution of the same; and for all risks of every description connected with the work; and for well and faithfully completing the work and the whole thereof, in full compliance with the Plans and Specifications and the requirements of the Engineer under them.

The stated prices shall cover the cost of all plants and tools and of all work and materials of whatsoever kind that shall be furnished or needed to complete the entire work in all details ready for the purpose for which it is intended. Said prices shall also cover all royalties for patents and patented materials, appliances, and processes used in the work described in the specifications and agreements.

30. MONTHLY ESTIMATES AND PAYMENTS

The Owner agrees to pay the Contractor the sums herein specified in monthly installments as the work progresses upon certificates signed by the Engineer, but said certificates, however, shall in no way lessen the total and final responsibility of the Contractor. It is agreed that the amount to be paid from time to time shall in no case exceed ninety (90) percent of the value of the work properly performed or materials or equipment delivered under this contract, and the remaining ten (10) percent shall be reserved by said Owner as part security for the faithful performance hereof and shall not become due the Contractor until the expiration of thirty (30) days after the completion of said work and delivery of the final certificates to the Engineer and after payment by the Contractor of all claims for labor and materials furnished in the performance of all work under this contract.

The Engineer may, at his discretion, include in the aforesaid progress certificates an estimate of the equipment and materials, except cement, necessary for incorporation in the work which have been delivered upon the site of the work, and for which receipted invoices have been delivered to the Engineer. Any such payment for equipment or materials, however, shall not relieve the Contractor of any responsibility to furnish all necessary equipment and materials as needed for the prosecution of the work in the same manner as if payment had not been made.

It is further expressly agreed that the granting of any progress certificates, or payment hereunder, shall in no way lessen the liability of the Contractor to replace defective work, though the same may not have been detected at the time equipment, material, and such certificate was given or acted upon. All progress certificates being made merely upon approximate estimates shall be subject to the correction of the final certificate.

The value of the work properly performed shall be estimated by the Engineer at the end of each month. To facilitate this estimate, the Contractor shall furnish the Engineer with a balanced statement in detail showing the division of cost for each of the various sub-items comprised in the lump sum and such other information as may be of aid in

preparation of the monthly estimates. This balanced statement shall be provided at the monthly progress meeting and will be accompanied by any and all supporting documentation.

31. FINAL ESTIMATE AND PAYMENT

Upon completion of all the work included under this contract and the final inspection thereof and the performance of satisfactory operation and acceptance tests, and after the Contractor shall have submitted acceptable evidence as to the satisfaction of all claims, the Engineer will certify to that effect. The said Contractor further agrees that he shall not be entitled to demand or receive final payments for any portion of the aforesaid work or materials, except in the manner set forth in this agreement; nor until all the stipulations, provisions, and conditions hereinabove mentioned are complied with and the Engineer shall have given his certificate to that effect; whereupon the Owner will, at the expiration of thirty (30) days after such completion and delivery of such certificates, pay and hereby binds himself to pay to the Contractor in cash, the whole amount of money accruing to said Contractor under this contract, except such sum or sums of money that have already been paid, and as may be lawfully retained under any of the provisions of his contract herein set forth.

32. FINAL PAYMENT TO RELEASE OWNER

The acceptance by the Contractor of the final payment shall be and shall operate as a release to the Owner of all claims and all liability to the Contractor for all things done or performed for or relating to the work, and for every act and neglect of the Owner and others relating to or arising out of the work, excepting only his claims, if any, for amounts withheld by the Owner, upon final payment. No payment, however, final or otherwise, shall operate to release the Contractor or his Sureties from any obligation upon or under this contract or the Contractor's Bond.

33. JOB SITE SAFETY

None of the specifications, conditions, plans or terms of the contract between the Owner and Contractor or the Owner and the Engineer or inspector shall be construed to impose any responsibility upon the Owner, Groundwater Technology, Inc. or Wightman Petrie, Inc., their employees, inspectors or other agents, for review, determination and/or supervision of job site safety. The construction means, manner and method remains the sole responsibility of the Contractor, and neither the Engineer nor the Owner shall be responsible for the failure of the Contractor to provide a safe work place for the employees, employees of other contractors, or the general public.

The Engineer's responsibility on the job site is solely to determine compliance with the construction documents, drawings and specifications. The Engineer is not authorized by the Owner nor is he responsible for the construction means, manner and method

undertaken by the Contractor nor is he responsible to determine and/or evaluate the job site safety of the project. Job site safety is the sole responsibility of the Contractor.

PART 4

SCHEDULE OF DRAWINGS

The drawings which are applicable to the work to be performed under this contract and which are referred to in the contract documents as "the plans" or "plans" are identified as follows:

Conrail-Elkhart Yard Municipal

Water Main Extension

Drawing Numbers X-0183-1 through X-0183-39

And

Groundwater Extraction System

Drawing Numbers X-0195-1 through X-0195-20

March 1994

As Prepared By:

Wightman Petrie, Inc.
2340 Cassopolis Street
Elkhart, IN 46514
Telephone: 219-264-4587

SD-1

PART 5

GENERAL SPECIFICATIONS

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PART 5

GENERAL SPECIFICATIONS

1. FORWARD

The work specified to be done by the Contractor in the following sections under the "General Specifications" is to be done at the expense of the Contractor and will not be measured in determining quantities for payment unless otherwise specified.

The unit and lump sum prices stated in the contract hereto attached to be paid for work under the respective items shall be full compensation for all work set forth herein under the General Specifications.

2. BOUNDARIES OF WORK

The Owner will provide right-of-ways and easements for all work specified in this contract, and the Contractor shall not enter or occupy with men, tools or materials any private ground outside of said easements or outside the property of the municipality without the consent of the Owner. Other contractors of the Owner may, for all purposes required by their contracts, enter upon the work and premises used by the Contractor, and the Contractor shall give to other contractors of the Owner all reasonable facilities and assistance for the completion of adjoining work.

3. PROFILES AND TOPOGRAPHY

Topography and profiles (where applicable) of the ground are shown on the plans which accompany these specifications. These profiles and topography are believed to be reasonably correct, but are not guaranteed to be absolutely so, and together with any schedule of quantities, are presented only as an approximation.

4. INTERFERENCE

The Contractor shall so conduct the work that there shall be no interference with work which may be in progress under contracts with other contractors. In case of dispute between the Contractor and other contractors employed by the Owner, the decision of the Engineer shall be final and binding on both parties thereto.

Particular attention is called to General Condition, Section 8 - Cooperation.

The Contractor shall not discharge, nor cause to be discharged, water or sewage, nor dispose of, pile or store any material whatsoever in such a manner as to interfere with or interrupt the work of others.

5. NOTIFICATION BY CONTRACTOR

Sufficient notice shall be given by the Contractor to all county, state and municipal departments, Public Service Corporations, and property owners whose pipes, poles, roads, streets, highways, tracks, wires, or conduits or other structures may be affected by the work in order that they may protect, adjust, remove or rebuild them, or take such measures as they may desire to minimize inconvenience. He shall notify the Chief of the Fire Department in each jurisdiction twenty-four hours in advance of the temporary blocking of any street. He shall also notify the Municipal Water Works Department and receive its authorized representative's approval before cutting into existing mains or shutting off water main services, except in cases of emergency.

6. LINES AND GRADES

The Engineer will furnish basic reference lines and bench marks from which the Contractor shall establish such lines and grades as are needed for properly constructing the work in accordance with the contract documents. Such lines and grades shall be established by a qualified engineer or surveyor. Where measurements of the work for payment are dependent upon taking field measurements or levels prior to subsequent operations, the Engineer shall be notified and then given sufficient time to obtain the necessary field data.

7. EQUIVALENT PRODUCTS

Whenever in any of the contract documents an article, material, or equipment is defined by describing a proprietary product, or by using the name of a manufacturer or vendor, the term "or equal", if not inserted, shall be implied. The specific article, material, or equipment mentioned shall be understood as indicating the type, function, minimum standard of design, efficiency, and quality desired, and shall not be construed in such manner as to exclude manufacturer's products of comparable quality, design, and efficiency. The Contractor shall comply with the requirements of the contract documents relative to the Project Engineer's approval of materials and equipment before they are incorporated in the product.

8. SUPERINTENDENCE AND WORKMEN

The Contractor shall have a competent foreman, superintendent, or other representative on the work who shall have full authority to act for the Contractor and to receive and execute orders from the Engineer or owner, and who shall see that the work is executed in accordance with the specifications and plans and the orders of the Engineer thereunder. Where special skill is required, only men who are competent and skillful in their respective lines of work shall be employed.

9. PLANT, TOOLS AND EQUIPMENT

The Contractor shall furnish all material and supplies, plant, staging, and false work, machinery and tools, in fact, all materials and appliances of every sort or kind that may be necessary for the full and complete carrying out of this contract. Any equipment which may be regarded as inefficient or unsuitable may be ordered repaired or removed from the site.

The Contractor shall assume full responsibility for the adequacy of equipment and failure of the Engineer to order its repair or removal shall not relieve him of any obligation under this contract.

10. TEMPORARY TOILET ACCOMMODATIONS

The Contractor shall furnish, install, and maintain ample sanitary facilities for the workmen; toilets shall be placed at the time work starts. These temporary toilet facilities shall be placed where directed by the Owner and maintained as required by the local health ordinances. He shall provide the necessary temporary enclosures to accommodate the toilets. The toilets shall be maintained in a sanitary condition and contents removed from premises as often as required.

11. PRECAUTIONS

The Contractor shall take whatever precaution that may be necessary to render any portion of the work secure in every respect, or to decrease the probability of accident from any cause, or to avoid contingencies which are likely to delay the completion of the work.

All machinery and equipment and other physical hazards shall be guarded in accordance with the safety provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, and in accordance with Federal, State, or Municipal laws and regulations applicable to such safety measures.

12. PUBLIC CONVENIENCE AND SAFETY

The Contractor shall at all times conduct the work in such manner as to insure the least obstruction to traffic. Materials stored upon the streets or along the right-of-way should be placed so as to cause only such inconvenience to the traveling public and residents as is considered unavoidable.

13. BARRICADES AND WARNING SIGNS

The Contractor shall provide and maintain proper barricades, fences, signal lights, or watchmen to properly protect the work, persons, animals, and property against injury. All signage shall be in full compliance with the current edition of the Indiana Manual of Uniform Traffic Control Devices of 1988. Between the hours of sunset and sunrise the Contractor shall provide and maintain at least two (2) yellow lights at each barricade and such other points as are necessary to protect the traveling public. These statements of specific duties on the part of the Contractor shall not be considered as a limitation on the general duties imposed by the contract or specifications.

The Owner reserves the right to remedy any neglect on the part of the Contractor as regards the protection of the work after twenty-four hours notice in writing, except in case of emergency when it shall have the right to remedy any neglect without notice, and in either case, to deduct the cost of such remedy from any money due or to become due the Contractor.

14. ACCESS TO PUBLIC SERVICES

Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves, manholes, fire alarm or police call boxes in the vicinity.

15. PILING MATERIAL AND CARE OF STRUCTURES

All excavated and other materials shall be so piled as not to endanger the work and so that free access may be had at any time to all parts of the work, and shall be kept neatly piled so as to inconvenience public travel or adjoining tenants as little as possible.

Proper provision shall be made for the handling of materials and for the protection of traffic and public. Materials required for the work may be placed upon the side of the roadway or parking area of streets and alleys adjacent to the work. Reasonable and satisfactory provision shall be made for travel on sidewalks, crosswalks, streets, roads, railroads, street railways, and private ways. Walkways shall be kept clean and unobstructed. All fences and other structures in the vicinity of the work shall be protected and, if damaged, shall be repaired or replaced. All trees shall be satisfactorily protected by boxes or otherwise.

16. PROTECTION AND RESTORATION OF PROPERTY

The Contractor shall not enter upon private property for any purpose without obtaining proper permission. He shall be responsible for the preservation from injury or damage resulting directly or indirectly from the execution or nonexecution of the work under this contract of all public and private property adjacent to the work. He shall take

all necessary precautions to prevent damage to trees, pipes, conduits, and other underground structures, public utilities, etc., and shall protect carefully from disturbance or damage all property marks or markers. The Contractor shall contact all utilities in the area of the proposed construction and have them locate their utility lines prior to the start of work. All disturbed areas shall be restored to like or better condition after construction including but not necessarily limited to sodding, seeding, landscaping concrete restoration, gravel or paved areas, retaining walls, sprinkler systems or otherwise private or public improvements.

17. CONSTRUCTION SITE VIDEO: The contractor shall provide the owner a VHS video tape of the construction site before construction begins and after construction is complete. This tape, which will become the property of the owner, shall include all areas that could possibly be damaged either directly or indirectly by construction. All cost for this activity shall be merged into other bid items.

18. OPENING OF SECTION OF WORK

Whenever, in the opinion of the Engineer, all of the work or any portion thereof is in suitable condition for opening or use, it shall be opened as may be directed, but such opening shall not be construed as an acceptance of the work or any part thereof, or as a waiver of any of the provisions of these specifications and contract.

19. LIMITATIONS OF OPERATIONS

Whenever, in the judgment of the Engineer, the Contractor has obstructed or closed a greater portion of the work than is necessary for the proper prosecution of the work, or is carrying on operations to the prejudice of work already started, the Engineer may require the Contractor to finish the part on which work is in progress before any additional portions are started. Work shall be conducted so as to create a minimum amount of inconvenience to the public.

20. FINAL CLEANING UP

Before acceptance and final payment shall be made, adjacent property, the right-of-way or streets, and all grounds occupied by the Contractor in connection with the work, shall be cleaned of all rubbish, excess materials, temporary buildings, etc., and the Contractor shall restore in an acceptable manner all property, both public and private, which may have been damaged during the prosecution of the work, and all parts of the work shall be left in a neat and presentable condition, as good as or better than it was at the beginning of construction.

**21. REMOVAL & REPLACEMENT OF UNCLASSIFIED ROAD SURFACING,
SIDEWALKS, CURB AND GUTTER, DRIVEWAYS, ETC.**

All pavement and/or street and road surfacing which is not classified for measurement and payment under separate Contract Items for Pavement Replacement, shall be replaced and/or restored to a condition equal to, or better than that which existed prior to the start of work. Also included as part of the work, the Contractor shall restore and/or repair all sidewalks, crosswalks, curbs, gutters, driveways, shoulders of roads and paved streets, parking areas, mailbox turn-outs, parkways, lawns, mailboxes, street signs, miscellaneous structures, etc. The replacement and/or repair work shall be done without delay, as soon as the work immediately adjacent is completed. In any event, the removed or damaged facilities, etc. shall be restored to a condition equal to or better than that which existed prior to the start of the work.

Where lawn sod is removed, either on public or private property, it shall be carefully preserved and later replaced, or the area where sod has been removed shall be covered with a 4- inch thick layer of good black dirt and seeded with an approved grass mixture in an amount of at least 200 pounds of pure, live seed per acre of surface.

22. LIMITATIONS ON OPEN TRENCH

The Contractor shall not open, nor leave open, any more trench than is absolutely necessary, and as approved by the Engineer, to carry out the construction work in an efficient manner.

23. CONTRACTOR'S GUARANTEE

The Contractor's performance bond shall remain in force throughout the period of construction and shall continue in force for a period of one (1) year following the final inspection and acceptance of the project by the Owner.

24. PAYMENT AFTER EXPIRATION OF CONTRACT

If the time for completion called for in the contract or any extension of time agreed to by the Owner has expired, the Owner reserves the right to stop progress payments under the contract and to make only the final payment due. Said final payment shall be adjusted by any liquidated damages incurred.

25. BUILDERS RISK INSURANCE

The Contractor shall furnish a Builders Risk Policy covering the Owner and Contractor, which shall be paid for by the Contractor, to the full value on the insurable portion of the project against perils of fire, lightning, wind, explosion, damage to any and

all utilities, collapse of or structural damage to any building or structure, and vandalism and malicious mischief. The original of the policy shall be furnished to the Owner.

26. SPECIAL PROVISIONS AND SUPPLEMENT SPECIFICATIONS

1. **SPECIFICATIONS:** The following special provisions and supplemental specifications are in addition to the INDIANA DEPARTMENT OF TRANSPORTATION 1993 "STANDARD SPECIFICATIONS", which standard specifications shall apply to this contract.

These special provisions and supplemental specifications and plans shall govern over the STANDARD SPECIFICATIONS in case of conflict therein.

2. **Variances with State Highway Specifications:** If existing sections or subsequent additions to these specifications vary with said State Highway Specifications, or if variances occur on the plans or are directed by the Engineer, said variances shall NOT be construed to invalidate those parts of the section of the State Highway Specifications which are not in variance or conflict and the variances together with the remaining portion of these State Highway Specifications not in conflict, shall constitute the specifications for the structures.

3. **Barricades, Barriers, Traffic Signs and Lights:** The Contractor shall provide all necessary barricades, warning signs and lights necessary for the protection of the public. They shall meet the approval of the Engineer. Payment for the barricades and warning lights shall be made as listed in the itemized proposal and shall include and be full compensation for furnishing all materials, construction, maintenance, removal and incidentals necessary to complete the item.

4. **Cooperation with Public and Privately Owned Utilities:** The Contractor should especially note the provisions of Section 105.06 Standard Specifications. In the event a permit or permits are approved by the City or County for the installation of utility structures, conduits, lines or appurtenances on or in the structure or its approaches, the

Contractor shall cooperate with the Utility Company making such installation, permit entry and allow reasonable time for the completion of the installation, permittee shall not damage or unnecessarily interfere with the Contractor's work and will be required to make suitable arrangements with the Contractor for all installations. No payment will be made by the Owner for any delay or inconvenience caused by such installation. No compensation will be allowed for moving City or County owned utility appurtenances.

5. **Public Utilities and Private Structures:** The Contractor shall assume all risk and liability for any inconvenience, delay or expense that may be occasioned him by Public Utilities or other Public or private property within the limits of the proposed improvement,

whether or not such property is shown on the plans and shall do no work which will injure or damage such property until satisfactory arrangements have been completed with the owner for its protection, relocation or reconstruction.

The Contractor shall give notice to owners of gas pipes, water pipes and conduits in sufficient time for the owners to take means to relocate or to protect their property.

At points where the Contractor's operations are adjacent to properties of telegraph, telephone and power companies or are adjacent to other property, damage to which might result in considerable expense to others, loss or inconvenience, work shall not be started until all arrangements necessary for the protection, relocation or reconstruction thereof have been completed.

The Contractor shall cooperate with the owners of any underground or overhead utility facilities in their removal, relocation or reconstruction operations in order that these operations may progress in a reasonable manner and that duplication of rearrangement may be reduced to a minimum and that services rendered by these parties will not be unnecessarily interrupted.

In the event of interruption of water utility services as a result of accidental breakage or as a result of being exposed or unsupported, the Contractor shall immediately notify the proper authority of the affected utility. He shall cooperate with the interested in the restoration of service as promptly as possible.

6. The Contractor shall furnish the Engineer a monthly record of all material received that will be incorporated in the completed work. The record shall be prepared on forms furnished by the Engineer and in accordance with prevailing instructions.

7. Contractor's Responsibility for Matching Old Work: Where new work is to be fitted to old work, the Contractor shall check all leading dimensions and conditions in the field and report any errors or discrepancies to the Engineer or assume responsibility for their correctness and fit of new parts to the old. If such parts do not fit properly he shall make and pay for such alterations or new parts and may be necessary to assure proper fits and connections, meeting the approval of the Engineer.

8. Protection of trees: No trees outside the right of way or effective trench limits are to be damaged or trimmed unless approved by the Engineer.

9. Increased or Decreased Quantities of Work: These special provisions shall not be considered as a waiver of nor shall they invalidate the right of the Engineer to increase or decrease the quantities of work, as proved by 109.03. (1993 Standard Specifications)

10. Local Permits - The contractor will obtain all need permits to work within the public right of way in Elkhart County and St. Joseph County. Permit bonds will be required in each jurisdiction.

11. The Contractor shall be responsible for obtaining local building permits to make needed alterations to interior plumbing when performing service connections to existing users. Permit fees will be required in each jurisdiction.

APPENDIX GS-A

CONRAIL SPECIFICATIONS

The following specifications are incorporated into and will be considered a part of the project general specifications. Details related to construction practices and materials have been incorporated into the project specifications in Part 6 herein. Where conflicts (if any) exist, the project engineer will provide direction or interpretation and in general will apply the more restrictive requirement in each case.

CONSOLIDATED RAIL CORPORATION

SPECIFICATIONS

FOR

CONSTRUCTION

OF

POLLUTION ABATEMENT FACILITIES

AND PERFORMANCE OF RELATED WORK

AT

ELKHART YARD

ELKHART, INDIANA

DATE - MO/DAY, 1994

SPECIFICATION NO. 49XXX-S

J. D. COSSEL

CHIEF ENGINEER -

DESIGN & CONSTRUCTION

INDEX TO SPECIFICATIONSSECTION DESCRIPTIONDIVISION 1 - GENERAL REQUIREMENTS

01010	SUMMARY OF CONTRACT WORK
01020	LIST OF CONTRACT DOCUMENTS
01030	GENERAL CONDITIONS
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01050	CONTRACT (PROJECT) CLOSEOUT
01060	PROJECT RECORD DOCUMENTS
01070	OPERATION AND MAINTENANCE

* CONSTRUCTION

*

SECTION 01010
SUMMARY OF CONTRACT WORK
-----PART 1 - GENERAL

1.01 OUTLINE OF CONTRACT WORK

A. THE WORK TO BE DONE UNDER THIS HEADING SHALL INCLUDE THE FURNISHING OF ALL THE NECESSARY TOOLS, EQUIPMENT, LABOR, MATERIALS, INSURANCE, AND CERTIFICATES OF OCCUPANCY, AND ALL PERMITS, ETC., NECESSARY FOR ???????? GENERAL DESCRIPTION OF PROJECT ?????????? THE CONSTRUCTION OF ?????????????? COMPLETE (EXCEPT FOR WORK SPECIFICALLY EXEMPTED UNDER ARTICLE 1.02 OF THIS SECTION) AND IN ACCORDANCE WITH ALL CONTRACT DOCUMENTS LISTED AND/OR MODIFIED UNDER SECTION 01020 OF THESE SPECIFICATIONS, AND IN OTHER APPLICABLE DOCUMENTS, ETC.

B. CONSTRUCTION OF THIS PROJECT SHALL INCLUDE (BUT NOT BE LIMITED TO) ??????????

C. THIS PROJECT SHALL ALSO REQUIRE OUTSIDE MECHANICAL AND ELECTRICAL WORK, INCLUDING ??????????

1.02 WORK NOT INCLUDED IN CONTRACT

A. FLAGGING WILL BE PROVIDED BY CONRAIL AT NO EXPENSE TO THE CONTRACTOR ON TRACK TIME ARRANGED BY THE PROJECT ENGINEER. IT SHOULD BE NOTED THAT THE RAIL TRAFFIC SCHEDULING TAKES PRECEDENCE OVER ANY AND ALL WORK. WORK MAY BE INTERRUPTED AT ANY TIME FOR RAIL TRAFFIC.

* CONSTRUCTION

x

SECTION 01020

LIST OF CONTRACT DOCUMENTS

PART 1 - GENERAL

1.01 DRAWINGS

A. THE FOLLOWING SHEETS ARE DATED ??????????
WITH THE LATEST REVISION FOR EACH DRAWING AS
INDICATED:

SHEET NO.	DESCRIPTION	DATE OF LATEST REVISION
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(PLAN NUMBER 49XXX)

1.02 SPECIFICATIONS

A. SPECIFICATION NO. 49XXX-S DATED MONTH, DAY, YEAR.

B. STANDARD SPECIFICATIONS AND DOCUMENTS WHICH MAY BE
REFERRED TO IN CONNECTION WITH THE WORK UNDER THE
CONTRACT, AND WHICH FORM AN ESSENTIAL PART OF THESE
SPECIFICATIONS, INCLUDE THOSE OF THE FOLLOWING
ORGANIZATIONS:

1. AMERICAN RAILWAY ENGINEERING ASSOCIATION
MANUAL OF RECOMMENDED PRACTICE, INCLUDING
CURRENT REVISIONS.

2. AMERICAN SOCIETY FOR TESTING MATERIALS BOOK

OF STANDARDS, INCLUDING CURRENT REVISIONS.

3. AMERICAN INSTITUTE OF STEEL CONSTRUCTION,
CURRENT REVISIONS.

4. AMERICAN CONCRETE INSTITUTE, CURRENT
REVISIONS.

5. SPECIFICATIONS FOR THE INSTALLATION OF
PIPE CULVERTS, A.R.E.A., DATED 1962.

6. SPECIFICATIONS FOR BITUMINOUS COATED
CORRUGATED METAL PIPE AND ARCHES,
A.R.E.A., DATED 1962.

7. SPECIFICATIONS FOR BALLAST, MW 170B,
ISSUED 8-5-82 (REVISED 12-83).

8. SPECIFICATIONS FOR PREFABRICATED
CORRUGATED STEEL PIPE AND PIPE ARCHES FOR
CULVERTS AND UNDERDRAINS, A.R.E.A., DATED 1969.

9. SPECIFICATIONS FOR CONSTRUCTION OF
RAILROAD ROADBED, C.E. 75, LATEST REVISION.

10. SPECIFICATION FOR SUBBASE (SUB-BALLAST),
ASTM D-1241-68 (REAPPROVED 1974), TYPE I,
GRADATION 'A'.

✓ 11. CONRAIL SPECIFICATIONS FOR PIPELINE
OCCUPANCY, C.E. 8, DATED 2-1-91.

12. CONSOLIDATED RAIL CORPORATION GENERAL
SPECIFICATION(S) FOR THE DESIGN & CONSTRUCTION
OF CONCRETE STRUCTURES AND FOUNDATIONS, C.E. 77,
DATED JANUARY, 1991.

13. CONSOLIDATED RAIL CORPORATION BOOKLET
NO. S7C, EFFECTIVE 12-1-90, ENTITLED "SAFETY
RULES AND PROCEDURES" (REVISED 12-90 & 8-92).

14. CONRAIL SPECIFICATION EWP-1, ENTITLED

"STANDARD SPECIFICATION FOR ADDITIONAL AND EXTRA
WORK OR EXTRA WORK ON A TIME AND MATERIAL BASIS -
(EWP-1) - REVISED 5/10/90"

C. IN THE EVENT THAT THE APPLICABLE PORTIONS OF THE
STANDARD SPECIFICATIONS NOTED ABOVE AND THESE WRITTEN
SPECIFICATIONS DIFFER IN CONTENT, SUCH PORTIONS OF
THESE WRITTEN SPECIFICATIONS SHALL GOVERN.

D. OTHER STANDARD SPECIFICATIONS AND DOCUMENTS
REFERENCED IN THE SPECIFICATIONS, AVAILABLE FROM
THE APPROPRIATE GOVERNMENT OR PRIVATE AGENCY AT
CONTRACTOR'S EXPENSE, ARE AS FOLLOWS:

1. AMERICAN ASSOCIATION OF STATE HIGHWAY
AND TRANSPORTATION OFFICIALS (AASHTO),
"AASHTO MATERIALS", LATEST REVISION.
- REFERENCED AS "AASHTO SPECS".

E. IN THE EVENT THAT THE STANDARD SPECIFICATIONS
NOTED ABOVE AND THESE WRITTEN SPECIFICATIONS
DIFFER IN CONTENT, THESE WRITTEN SPECIFICATIONS
SHALL GOVERN.

1.03 CONTRACT

A. CONSOLIDATED RAIL CORPORATION GENERAL
CONSTRUCTION CONTRACT, REVISED 8-90 & 1-93.

* CONSTRUCTION

*

01000

SECTION ~~01000~~

GENERAL CONDITIONS

PART 1 - GENERAL

1.01 DEFINITIONS

A. WHEREVER THE FOLLOWING WORDS ARE USED IN THESE SPECIFICATIONS, THEY SHALL HAVE THE RESPECTIVE MEANINGS:

1. OWNER, COMPANY, RAILROAD AND/OR CONRAIL - REFER TO CONSOLIDATED RAIL CORPORATION.
2. CHIEF ENGINEER, AREA ENGINEER, PROJECT ENGINEER AND/OR ENGINEER REFER TO THE CHIEF ENGINEER - DESIGN & CONSTRUCTION OF CONSOLIDATED RAIL CORPORATION OR HIS APPOINTED REPRESENTATIVES.
3. CONTRACTOR - REFERS TO THE PERSON, FIRM OR CORPORATION HAVING A DIRECT CONTRACT WITH CONRAIL FOR THE PERFORMANCE OF THE WORK.
4. APPROVAL, APPROVED AND/OR APPROVED EQUAL - WHERE USED IN THESE SPECIFICATIONS, THE MEANING OF THE TERM SHALL BE AS DEFINED IN THE INDIVIDUAL SECTION WHERE USED. IN NO CASE SHALL IT BE CONSTRUED TO MEAN THE ACCEPTANCE OF METHODS, MATERIAL, AND/OR EQUIPMENT SHOULD THEY PROVE DEFECTIVE OR UNSUITABLE NOR SHALL APPROVAL BY THE CHIEF ENGINEER ACT TO RELIEVE THE CONTRACTOR OF ITS RESPONSIBILITIES UNDER THE TERMS OF THE CONTRACT.
5. SHOP DRAWINGS - REFERS TO DRAWINGS, DIAGRAMS, SCHEDULES, MATERIAL AND EQUIPMENT DATA, AND ANY

OTHER DATA SPECIALLY PREPARED FOR THE WORK BY THE CONTRACTOR OR ANY SUBCONTRACTOR, MANUFACTURER, SUPPLIER OR DISTRIBUTOR TO ILLUSTRATE SOME PORTION OF THE WORK.

6. MATERIAL AND EQUIPMENT DATA - REFERS TO ILLUSTRATIONS, STANDARD SCHEDULES, PERFORMANCE CHARTS, INSTRUCTIONS, MANUFACTURER'S SPECIFICATIONS, BROCHURES, DIAGRAMS, SAMPLES, AND OTHER INFORMATION FURNISHED BY THE CONTRACTOR TO ILLUSTRATE MATERIAL AND/OR EQUIPMENT FOR SOME PORTION OF THE WORK.

1.02 SCOPE

A. THE FOLLOWING GENERAL CONDITIONS APPLY TO AND GOVERN ALL SECTIONS OF THESE SPECIFICATIONS. THEY ARE FOR THE GUIDANCE OF ALL TRADES AND SHALL BE BINDING UPON EACH SEPARATE BRANCH OF THE WORK INSOFAR AS THEY MAY IN ANY WAY BE APPLICABLE THERETO.

B. IT IS THE INTENTION THAT THESE SPECIFICATIONS SHALL PROVIDE A COMPLETE PROJECT. ALL MATERIALS, LABOR AND EQUIPMENT NECESSARY FOR THE COMPLETION OF THE WORK SHALL BE INCLUDED, AND THE OMISSION OF SPECIFIC REFERENCE TO ANY PART OF THE WORK NECESSARY FOR SUCH COMPLETION SHALL NOT BE INTERPRETED AS RELIEVING THE CONTRACTOR FROM FURNISHING OR CONSTRUCTING SUCH PARTS.

1.03 EXAMINATION OF THE SITE

A. THE CONTRACTOR'S SIGNING OF THE CONTRACT WILL BE DEEMED AS AN ACKNOWLEDGEMENT THAT IT HAS EXAMINED THE PREMISES AND IS FAMILIAR WITH EXISTING CONDITIONS OF THE SITE, THE DIFFICULTIES ATTENDING THE EXECUTION OF THE WORK, THE LOCAL LABOR CONDITIONS AND ALL MATTERS WHICH AFFECT THE EXECUTION OF THE WORK.

B. BURIED FIBER OPTIC CABLE - IN ADVANCE OF ANY WORK PERFORMED ON CONRAIL PROPERTY, THE CONTRACTOR MUST CONTACT THE OFFICE OF CONRAIL'S AREA ENGINEER TO VERIFY THE EXISTENCE OF ANY BURIED FIBER OPTIC CABLE

THAT MAY BE PRESENT IN THE VICINITY OF THE PROPOSED WORK. IF FIBER OPTIC CABLE DOES EXIST IN THE VICINITY OF PROPOSED WORK, THE CABLE COMPANY MUST BE CONTACTED IN SUFFICIENT TIME TO ALLOW THE CABLE COMPANY TO LOCATE AND PROTECT THE INSTALLATION PRIOR TO COMMENCEMENT OF ANY WORK. ONCE THE CONTRACTOR IS MADE AWARE OF THE PRESENCE OF THE FIBER OPTIC CABLE, THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGE TO SAID CABLE CAUSED BY THE CONTRACTOR.

1.04 DRAWINGS

A. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO SHOW AND DESCRIBE THE GENERAL CHARACTER AND EXTENT OF THE WORK TO BE DONE, AND THE KIND AND QUALITY OF THE MATERIALS TO BE USED. IN CASE OF CONFLICT, THE CONTRACT, SPECIFICATIONS, FULL SIZE DRAWINGS, LARGE SCALE DRAWINGS AND SMALL SCALE DRAWINGS SHALL TAKE PRECEDENCE IN THE ORDER NAMED. WHEN PARTS ONLY OF THE PROPOSED WORK ARE SHOWN, THE REMAINDER SHALL BE A REPETITION, UNLESS OTHERWISE NOTED. WHERE A DETAIL IS STARTED ON A DRAWING, SUCH DETAIL IN EXECUTION SHALL BE CARRIED THE FULL LENGTH OR EXTENT OF THE NUMBER OR PART OF THE WORK IT DETAILS. PARTS NOT SPECIFICALLY DETAILED SHALL BE CONSTRUCTED IN MANNER AND SPIRIT CONFORMING TO THE CLASS OF WORK REQUIRED FOR THE WHOLE OF WHICH THEY FORM A PART. WORK SHOWN ON SMALL SCALE DRAWINGS AND NOT ON LARGE SCALE DRAWINGS SHALL NOT BE CONSIDERED AS OMITTED UNLESS SPECIFICALLY SO NOTED THEREON. ADDITIONAL SCALE AND FULL SIZE DRAWINGS MAY BE FURNISHED IF AND AS REQUIRED TO MORE FULLY EXPLAIN THE CONTRACT DRAWINGS, AND SUCH ADDITIONAL DRAWINGS SHALL BE ACCEPTED AND FOLLOWED AS FORMING A PART OF THESE SPECIFICATIONS AND THE CONTRACT. NO WORK FOR WHICH FULL SIZE DRAWINGS ARE REQUIRED SHALL BE DONE PRIOR TO ISSUANCE THEREOF. SHOULD THE CONTRACTOR CONSIDER THE DETAILS CALL FOR MORE ELABORATE OR EXPENSIVE WORK THAN THE CONTRACT DRAWINGS WARRANT, IT SHALL SO NOTIFY THE CHIEF ENGINEER WITHIN FIVE (5) DAYS AFTER RECEIPT THEREOF, AND PENDING THE DETERMINATION OF WHICH, NO WORK AFFECTED BY SUCH DETAILS SHALL BE

DONE. SHOULD THE CONTRACTOR FAIL TO NOTIFY THE CHIEF ENGINEER WITHIN THE TIME REQUIRED, IT SHALL ACCEPT THE DETAIL DRAWINGS AND EXECUTE THE WORK IN ACCORDANCE THEREWITH. SHOULD THE CONTRACTOR REQUIRE ADDITIONAL DRAWINGS, IT SHALL SO NOTIFY THE CHIEF ENGINEER IN WRITING AT LEAST TWO (2) WEEKS BEFORE SUCH DRAWINGS ARE ACTUALLY NEEDED. REQUESTS FOR ADDITIONAL DRAWINGS SHALL, INSOFAR AS PRACTICAL, GIVE THE SEQUENCE AND DATES WHEN THE DRAWINGS WILL BE REQUIRED TO AFFORD A REASONABLE TIME FOR THE PREPARATION THEREOF.

B. WHEN THE DIMENSIONS OR OTHER INFORMATION ON THE DRAWINGS ARE LACKING OR REQUIRE INTERPRETATION, OR CONFLICTS BETWEEN DOCUMENTS OCCUR, THE CONTRACTOR SHALL NOT PROCEED WITH THE WORK UNTIL THE CHIEF ENGINEER, IN WRITING, FURNISHES SUCH INFORMATION OR INTERPRETATION.

C. THE CONTRACTOR SHALL VERIFY DIMENSIONS AT THE SITE INSOFAR AS POSSIBLE AND REPORT ANY DISCREPANCIES WHICH MAY BE FOUND, BEFORE PROCEEDING WITH ANY WORK AFFECTED THEREBY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND MAKE GOOD AT ITS OWN EXPENSE, ANY ERRORS RESULTING FROM THE USE OF SUPERSEDED DRAWINGS AFTER DRAWINGS SHOWING REVISIONS HAVE BEEN ISSUED AND FORWARDED TO THE CONTRACTOR IN WRITING. THE CONTRACTOR SHALL FURNISH COPIES OF ALL DRAWINGS, SPECIFICATIONS, DETAILS AND APPROVED SHOP OR DETAIL DRAWINGS TO SUBCONTRACTORS AS MAY BE REQUIRED BY THEM.

D. CONSOLIDATED RAIL CORPORATION'S STANDARD DRAWINGS, WHERE REFERRED TO ON THE PLANS OR IN THE SPECIFICATIONS, MAY BE OBTAINED FROM THE OFFICE OF THE CHIEF ENGINEER - DESIGN AND CONSTRUCTION, 2001 MARKET STREET - 12B, P.O. 41412, PHILADELPHIA, PA 19101-1412.

1.05 SHOP DRAWINGS, MATERIAL AND EQUIPMENT DATA

A. THE CONTRACTOR SHALL PREPARE AND FURNISH TO THE CHIEF ENGINEER AS REQUIRED, ALL SHOP DRAWINGS

NECESSARY FOR THE CONSTRUCTION AND ERECTION OF THE WORK. SUCH DRAWINGS SHALL BE MADE FROM MEASUREMENTS TAKEN AT THE SITE WHEREVER POSSIBLE OR FROM ESTABLISHED MEASUREMENTS, WHEN ACTUAL MEASUREMENTS ARE NOT AVAILABLE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE ESTABLISHED MEASUREMENTS, THE INFORMATION FURNISHED TO HIS SUBCONTRACTORS FOR THE PREPARATION OF THEIR SHOP DRAWINGS, AND THE CHECKING OF ALL SHOP DRAWINGS. WHEN SATISFIED AS TO THEIR ACCURACY AND SUFFICIENCY, THE CONTRACTOR SHALL APPROVE AND SUBMIT, WITHIN FOUR (4) WEEKS OF RECEIPT OF FULLY EXECUTED CONTRACT, ALL SHOP DRAWINGS TO THE CHIEF ENGINEER FOR APPROVAL.

B. THE CONTRACTOR SHALL ALSO PREPARE AND FURNISH THE CHIEF ENGINEER WITH WORKING DRAWINGS AS MAY BE NECESSARY TO ADAPT DETAILS TO THE WORK OF VARIOUS TRADES, EXCEPTING THAT WHEN THE PRINCIPAL PART OF ALL SUCH WORK IS FURNISHED BY ONE (1) SUBCONTRACTOR, SUCH DRAWINGS MAY BE PREPARED BY THE SUBCONTRACTOR FOR SUCH WORK AND SUCH DRAWINGS SHALL SHOW THE RELATION OF THE WORK OF THE OTHER TRADES INVOLVED.

C. WITHIN TEN (10) DAYS AFTER NOTICE TO PROCEED AND PRIOR TO ORDERING OF MATERIAL OR EQUIPMENT, THE CONTRACTOR SHALL SUBMIT TO THE CHIEF ENGINEER FOR APPROVAL A LIST OF ALL MATERIAL AND EQUIPMENT PROPOSED FOR USE ALONG WITH A SCHEDULE FOR THE SUBMISSION OF MATERIAL AND EQUIPMENT DATA TO OBTAIN APPROVALS FOR EACH ITEM OF MATERIAL AND EQUIPMENT. INTENTION OF USING SPECIFIED MATERIALS DOES NOT RELIEVE THE CONTRACTOR OF THE OBLIGATION OF SUBMITTING THIS LIST AND SCHEDULE.

D. THE CONTRACTOR SHALL APPROVE AND SUBMIT EIGHT (8) COPIES OF SHOP DRAWINGS AND MATERIAL AND EQUIPMENT DATA FOR APPROVAL, PROPERLY LABELED, INDICATING SPECIFIC SERVICE FOR WHICH USED, SECTION AND ARTICLE NUMBER OF SPECIFICATIONS GOVERNING, CONTRACTOR'S NAME, AND NAME OF JOB. MATERIAL AND EQUIPMENT DATA SUBMITTED TO DESCRIBE ITEMS ON WHICH APPROVAL IS BEING REQUESTED, SHALL

BE SPECIFIC, AND IDENTIFICATION IN CATALOG, PAMPHLET, ETC. OF WHICH ITEM SUBMITTED SHALL BE CLEARLY MADE IN INK. DATA OF A GENERAL NATURE WILL NOT BE ACCEPTED. THE CHIEF ENGINEER WILL RETURN FOUR (4) COPIES TO THE CONTRACTOR UPON WHICH HAS BEEN INDICATED AN APPROVAL OR NECESSARY CORRECTIONS, AND WILL RETAIN FOUR (4) COPIES FOR HIS FILE. IF ANY SUBMISSION IS RETURNED "DISAPPROVED", THE CONTRACTOR MUST SUBMIT EIGHT (8) REVISED COPIES FOR APPROVAL WITHIN TWENTY (20) CALENDAR DAYS.

E. IF MATERIAL OR EQUIPMENT IS ORDERED AND/OR INSTALLED BEFORE IT IS APPROVED, THE CONTRACTOR SHALL BE LIABLE FOR ITS REMOVAL AND REPLACEMENT AT NO CHARGE IF, IN THE OPINION OF THE CHIEF ENGINEER, THE MATERIAL OR EQUIPMENT DOES NOT MEET THE INTENT OF THE DRAWINGS AND SPECIFICATIONS.

F. THE APPROVAL OF SHOP DRAWINGS BY THE CHIEF ENGINEER COVERS ONLY THE GENERAL DESIGN AND CHARACTER OF DETAILS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE ACCURACY, DESIGN AND STRENGTH OF ALL THE DETAILS INVOLVED AND THE 'APPROVAL' OF SHOP DRAWINGS BY THE CHIEF ENGINEER SHALL NOT ABSOLVE THE CONTRACTOR FROM ANY RESPONSIBILITY.

1.06 SUBSTITUTION

A. THE CONTRACT COVERING WORK ON THIS PROJECT WILL BE BASED ON APPROVED MATERIALS AS CALLED FOR IN THESE SPECIFICATIONS.

B. AFTER THE EXECUTION OF THE CONTRACT, THE CONTRACTOR MAY SUBMIT SUBSTITUTIONS, BUT NO SUBSTITUTIONS WILL BE CONSIDERED OR PERMITTED UNLESS ACCOMPANIED BY A STATEMENT OF THE DIFFERENCE IN COST, IF ANY, BETWEEN THE ITEMS SPECIFIED AND THOSE OFFERED, AND UNLESS ACCEPTED AND APPROVED, IN WRITING, BY THE CHIEF ENGINEER. EACH REQUEST FOR SUBSTITUTION SHALL INCLUDE THE NAME OF THE MATERIAL OR EQUIPMENT FOR WHICH THE SUBSTITUTION IS REQUESTED, AND A COMPLETE DES-

DESCRIPTION OF THE PROPOSED SUBSTITUTE INCLUDING DRAWINGS, CUTS, PERFORMANCE AND TEST DATA PLUS ANY OTHER INFORMATION NECESSARY FOR AN EVALUATION. A STATEMENT SETTING FORTH ANY CHANGES IN OTHER MATERIALS, EQUIPMENT OR WORK THAT INCORPORATION OF THE SUBSTITUTE WOULD REQUIRE SHALL BE INCLUDED. THE BURDEN OF PROOF OF THE MERIT OF THE PROPOSED SUBSTITUTE IS UPON THE PROPOSER. THE DECISION AS MADE BY THE CHIEF ENGINEER OF APPROVAL OR DISAPPROVAL OF A PROPOSED SUBSTITUTION SHALL BE FINAL.

C. THE CONTRACTOR SHALL CHECK THE AVAILABILITY OF THE SPECIFIED MATERIALS AND SHALL TAKE THIS INTO ACCOUNT IN INDICATING TIME REQUIRED FOR CONSTRUCTION. IN LIGHT OF THIS, "UNAVAILABILITY" OF AN ITEM WILL NOT NORMALLY BE SUFFICIENT REASON FOR SUBSTITUTION.

1.07 WORKMANSHIP

A. THE WORKMANSHIP SHALL BE STRICTLY FIRST CLASS AND MEET THE APPROVAL OF THE CHIEF ENGINEER. ANY PORTION NOT CONSTRUCTED IN A WORKMANLIKE MANNER OR BY PERSONS NOT EXPERIENCED IN THE PARTICULAR WORK INVOLVED SHALL BE REMOVED BY THE CONTRACTOR AT ITS OWN EXPENSE.

B. ALL WORK, MATERIAL OR EQUIPMENT REJECTED BY THE CHIEF ENGINEER AS BEING DEFECTIVE AND NOT ACCEPTABLE UNDER THESE SPECIFICATIONS SHALL BE PROMPTLY REPLACED. CONRAIL RESERVES THE RIGHT TO MAKE ALL REMOVALS OR REPLACEMENTS OR BOTH, AT THE EXPENSE OF THE CONTRACTOR.

C. ALL MATERIALS SHALL BE PROPERLY PROTECTED FROM DAMAGE AND/OR THE EFFECTS OF INCLEMENT WEATHER DURING THE PROGRESS OF THE WORK UNTIL THE FINAL ACCEPTANCE OF THE WORK.

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND PAY ALL COSTS FOR REPAIRING FINISHED WORK DAMAGED THROUGH THE

NEGLIGENCE OF THE CONTRACTOR OR ITS EMPLOYEES.

E. ANY AND ALL WORK DONE CONTRARY TO OR IN DISREGARD TO THE INSTRUCTIONS OF THE CHIEF ENGINEER; WORK DONE BEYOND THE LINES AND GRADES SHOWN ON THE PLANS, UNLESS AUTHORIZED IN WRITING; AND/OR EXTRA WORK DONE WITHOUT WRITTEN AUTHORITY, WILL BE CONSIDERED AS UNAUTHORIZED AND AT THE EXPENSE OF THE CONTRACTOR. SUCH WORK SHALL NOT BE MEASURED OR PAID FOR BY THE RAILROAD.

1.08 COORDINATION AND COOPERATION

A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SATISFACTORY CARRYING OUT OF ITS WORK, THE FAITHFUL OBSERVANCE OF THE REQUIREMENTS OF THESE SPECIFICATIONS AND THEIR EFFICIENT SUPERVISION, AND THE COORDINATION OF ITS WORK WITH THE WORK OF ALL OTHER TRADES NOT INCLUDED IN THE CONTRACT.

B. THE CHIEF ENGINEER WILL DEAL ONLY WITH THE CONTRACTOR AND RECOGNIZE SUBCONTRACTORS ONLY AS CONTRACTOR'S EMPLOYEES, BUT MAY, INSOFAR AS MUTUALLY AGREED UPON, DEAL DIRECTLY WITH A SUBCONTRACTOR AS A MATTER OF CONVENIENCE IN THE PREPARATION AND EXECUTION OF THE WORK WITHOUT RELIEVING THE CONTRACTOR FROM THE RESPONSIBILITY THEREFOR. ORDERS WHICH AFFECT THE QUALITY OR COST OF THE WORK WILL BE ISSUED ONLY TO THE CONTRACTOR.

C. THE CONTRACTOR SHALL NOT SUBCONTRACT ANY PORTION OF THE WORK TO OTHER THAN RESPONSIBLE SUBCONTRACTORS WHOSE REPUTATION IN THEIR RESPECTIVE LINES IS BEYOND QUESTION. THE CONTRACTOR SHALL SUBMIT, IN WRITING, THE NAMES OF PROPOSED SUBCONTRACTORS TO THE CHIEF ENGINEER BEFORE ENTERING INTO ANY BINDING AGREEMENTS. THE CONTRACTOR SHALL, IF SO REQUIRED BY THE CHIEF ENGINEER, SUBMIT FOR REVIEW A COMPLETE LIST OF PROPOSED SUBCONTRACTORS PRIOR TO THE SIGNING OF THE CONTRACT. IF THE CHIEF ENGINEER FINDS CAUSE FOR OBJECTING TO THE USE OF ANY SUBCONTRACTOR, AND SO INFORMS THE CONTRACTOR IN WRITING, THEN THAT SUBCONTRACTOR SHALL BE REMOVED FROM THE LIST AND THE

CONTRACTOR SHALL SUBMIT AN ADDITIONAL SUBCONTRACTOR FOR REVIEW. DELETION OF A SUBCONTRACTOR FROM THE LIST SHALL NOT CONSTITUTE A BASIS FOR ANY INCREASE IN COST TO CONRAIL.

D. THE CONTRACTOR AGREES TO BIND EVERY SUBCONTRACTOR DOING WORK UNDER THE CONTRACT, BY THE TERMS OF THE CONTRACT AGREEMENT, AND THE DRAWINGS AND SPECIFICATIONS AS FAR AS APPLICABLE TO THE SUBCONTRACTOR'S WORK.

E. NO SUBCONTRACT WHETHER FOR LABOR, MATERIALS AND/OR EQUIPMENT SHALL UNDER ANY CIRCUMSTANCES RELIEVE THE CONTRACTOR OF ITS OBLIGATIONS OR LIABILITIES UNDER THE CONTRACT, OR HAVE ANY BEARING ON THE QUESTION OF GRANTING OR REFUSING AN EXTENSION OF THE DATE OF COMPLETION SHOULD THE SUBCONTRACTOR FAIL TO PERFORM THE WORK UNDERTAKEN BY THE CONTRACTOR.

1.09 CONSTRUCTION SCHEDULES

A. A PRE-CONSTRUCTION MEETING WILL BE HELD AT THE SITE, OR AT AN AGREED UPON LOCATION, ONCE THE CONTRACT HAS BEEN EXECUTED FOR THE SUBMISSION OF CONSTRUCTION SCHEDULES AND TO ANSWER ANY SPECIFIC QUESTIONS WHICH THE CONTRACTOR MAY HAVE CONCERNING THE PROJECT. THE CONTRACTOR WILL BE NOTIFIED IN WRITING AS TO THE DATE AND LOCATION OF THIS PRE-CONSTRUCTION MEETING.

B. THE CONTRACTOR SHALL SUBMIT THE FOLLOWING ITEMS FOR THE APPROVAL OF THE CHIEF ENGINEER AT THE PRE-CONSTRUCTION MEETING:

1. DETAILED CONSTRUCTION SCHEDULE SHOWING, IN CALENDAR DAYS, THE AMOUNT OF TIME REQUIRED FOR THE COMPLETION OF EACH AREA OF WORK FOR THE ENTIRE PROJECT IN THE SAME FORMAT AS EXHIBIT I.

2. PRELIMINARY SCHEDULE OF SHOP DRAWING AND MATERIAL AND EQUIPMENT DATA SUBMISSIONS.

3. SCHEDULE OF VALUES - A DETAILED COST BREAK-DOWN SHOWING THE EXACT APPORTIONMENT OF CONTRACT PRICES AMONG ALL THE ITEMS OF WORK WHICH ARE LISTED ON EXHIBIT II, DISTINGUISHING BETWEEN COSTS FOR EACH PROPOSAL ON THE PROPOSAL FORM; FOR EACH ITEM LISTED IN THE SCHEDULE OF VALUES, THERE MUST BE A CORRESPONDING ITEM SHOWN ON THE CONSTRUCTION SCHEDULE. THIS COST BREAKDOWN SHOULD BE PROVIDED ON THE SCHEDULE OF VALUES FORM, EXHIBIT II (SEE APPLICABLE ENCLOSURES). THE COMPLETED SCHEDULE OF VALUES, WHEN BROUGHT TO THE PRECONSTRUCTION MEETING, SHOULD BE ADDRESSED TO THE CHIEF ENGINEER. A COPY OF THE SCHEDULE OF VALUES SHOULD BE MAILED, PRIOR TO THE PRECONSTRUCTION MEETING, TO THE SENIOR BUYER-SERVICE CONTRACTS, 2001 MARKET STREET - 7B, PHILADELPHIA, PA 19103 AND THE CHIEF ENGINEER. NOTHING IN THIS PROCEDURE SHALL BE CONSIDERED AS CHANGING OR ALTERING PRICES AND COSTS DEFINED ELSEWHERE IN THE CONTRACT.

4. FAILURE TO PROVIDE THE ABOVE ITEMS MAY BE CONSIDERED AS CAUSE TO DELAY START OF THE PROJECT BUT IN NO WAY RELIEVES THE CONTRACTOR OF THE OBLIGATION OF COMPLETING WORK ON DATE STIPULATED IN CONTRACT.

C. THE WORK SHALL BE COMMENCED AFTER EXECUTION OF THE CONTRACT AS INDICATED IN THE CONTRACT. THE ENTIRE WORK THEREAFTER SHALL PROGRESS IN SUCH A MANNER AND AT SUCH TIMES AS THE CHIEF ENGINEER MAY DIRECT IN ORDER TO MEET THE PROJECT COMPLETION DATE.

D. THE WORK UNDER THE CONTRACT SHALL BE COMPLETED WITHIN THE TIME INDICATED IN THE CONTRACT.

1.10 LAYING OUT THE WORK

A. THE PROJECT ENGINEER WILL FURNISH A BENCH MARK AND INFORMATION IN ORDER FOR THE CONTRACTOR TO SET SURVEY STAKES FOR A CONSTRUCTION BASELINE. THE CONTRACTOR SHALL MAINTAIN THE ESTABLISHED BENCH MARK AND BASELINE AND SHALL LAY OUT THEREFROM THE WORK IT

IS TO PERFORM UNDER THE CONTRACT.

B. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE CONFORMITY OF THE FINISHED WORK TO THE LINES, GRADES AND BENCH MARKS GIVEN. ACCEPTANCE OF THE WORK WILL BE DEPENDENT UPON THIS CONFORMITY.

1.11 INTERFERENCE WITH UTILITIES, COMMUNICATIONS SYSTEMS, SIGNALS AND RAILROAD

A. THE CONTRACTOR SHALL NOTIFY THE OWNER COMPANY AND/OR CONRAIL IN ADVANCE WHEN REMOVAL OR SPECIAL PROTECTION OF UTILITIES, COMMUNICATION SYSTEMS, SIGNALS AND RAILROAD ARE OR MAY BE REQUIRED DURING THE PROGRESS OF THE WORK.

B. WHENEVER THE PERFORMANCE OF THE WORK EMBRACED WITHIN THE CONTRACT IN ANY MANNER IMPEDES THE USE OR OPERATION OF THE FACILITIES OF CONRAIL, THE CONTRACTOR SHALL, AT ITS OWN COST AND EXPENSE, COMPLY WITH ALL CONDITIONS THAT MAY BE IMPOSED BY CONRAIL.

C. ALL UTILITY LINES PARALLELING OR CROSSING THE WORK AREA ARE POTENTIAL HAZARDS TO WORKERS AND EQUIPMENT. ALL CONTRACTOR EMPLOYEES SHALL BE INSTRUCTED TO EXERT EXTREME CARE IN AVOIDING COMING IN CONTACT WITH OR CAUSING DAMAGE TO THEM.

1.12 TEMPORARY SERVICES

A. THE CONTRACTOR SHALL PAY FOR AND MAKE ALL ARRANGEMENTS FOR TEMPORARY ELECTRIC SERVICE CONNECTIONS AND SHALL EXTEND SERVICE, PROPERLY PROTECTED AND MAINTAINED, TO OUTLETS AT THE SITE DURING THE ENTIRE PERIOD OF CONSTRUCTION.

B. THE CONTRACTOR SHALL PROVIDE TEMPORARY HEAT DURING THE CONSTRUCTION OF THE FACILITIES FOR PREVENTION OF DAMAGE BY FREEZING, OR AS REQUIRED TO COMPLETE CONSTRUCTION.

C. THE CONTRACTOR SHALL PAY FOR AND MAKE ALL ARRANGE-

MENTS FOR TEMPORARY WATER LINES AND SERVICES, PROPERLY PROTECTED AND MAINTAINED, DURING THE ENTIRE PERIOD OF CONSTRUCTION.

1.13 PROTECTION OF WORK AND PROPERTY

A. THE CONTRACTOR SHALL TAKE OVER AND ASSUME ALL RESPONSIBILITY FOR THE ENTIRE PREMISES ASSIGNED TO IT, MAINTAIN ALL EXISTING PROTECTION AND PROVIDE ALL ADDITIONAL PROTECTION, INCLUDING FENCES AND BARRICADES, AS REQUIRED BY THE GOVERNING LAWS, REGULATIONS AND ORDINANCES AND, AS DIRECTED, TO PROPERLY SAFEGUARD EMPLOYEES, THE PUBLIC AND THE PROPERTY OF CONRAIL. ALL TEMPORARY PROTECTION SHALL BE REMOVED UPON COMPLETION OF THE PROJECT BY THE CONTRACTOR.

* CONSTRUCTION

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SECTION 01040
SPECIAL CONDITIONS

PART 1 - GENERAL

1.01 SITE CONDITIONS, PROJECT SCHEDULING

- A. THE CONTRACTOR SHALL VISIT THE SITE OF THE PROJECT AND BE RESPONSIBLE FOR ASCERTAINING PERTINANT LOCAL CONDITIONS, SUCH AS LOCATION, ACCESSIBILITY AND GENERAL CHARACTER OF THE SITE, THE CONDITIONS UNDER WHICH IT WILL BE OBLIGATED TO OPERATE IN PERFORMING THE WORK, AND CONDITIONS WHICH WILL IN ANY MANNNER AFFECT THE WORK UNDER THE CONTRACT.
- B. CONRAIL WILL OCCUPY PORTIONS OF THE PREMISES DURING THE ENTIRE PERIOD OF CONSTRUCTION FOR THE CONDUCT OF ITS NORMAL OPERATIONS. THE CONTRACTOR SHALL COOPERATE WITH THE PROJECT ENGINEER IN ALL CONTRACTOR OPERATIONS AND SHALL MINIMIZE CONFLICT WITH RAILROAD WORK OR TRAIN OPERATIONS.
- C. INASMUCH AS THE CONTRACT WORK IS TO BE PERFORMED IN AN OPERATING RAILROAD YARD, THE CONTRACTOR SHALL USE THE UTMOST VIGILANCE IN THE EXECUTION OF ITS WORK SO AS TO KEEP INTERFERENCE WITH YARD OPERATIONS, ALL TRACKS AND ALL ACCESS ROADS TO AN ABSOLUTE MINIMUM. APPROVED DUST AND NOISE CONTROL BARRIERS SHALL BE USED AS REQUIRED TO PROTECT THE ONGOING OPERATIONS. WHENEVER THE CONTRACTOR SHALL FIND IT NECESSARY TO INTERFERE WITH THESE OPERATIONS, TRACKS OR ROADS, THE CONTRACTOR SHALL FIRST NOTIFY THE PROJECT ENGINEER AND SECURE APPROVAL BEFORE PROCEEDING WITH THE WORK. CONRAIL SHALL BE THE SOLE JUDGE OF WHAT MEASURES ARE ADEQUATE TO PREVENT INTERFERENCE AND INTERRUPTION OF ITS PERSONNEL AND OPERATIONS.

D. NO CONSIDERATION WILL BE GIVEN TO CLAIMS ARISING FROM ANY MISUNDERSTANDING OF THE CONDITIONS OF THE SITE WHICH MAY NOW EXIST OR WHICH WILL DEVELOP AFTER THE AWARD OF THE CONTRACT.

E. ALL WORK PERFORMED CONTRARY TO OR REGARDLESS OF THE INSTRUCTIONS OF THE PROJECT ENGINEER, AND ALL WORK PERFORMED BEYOND THE LINES AND GRADES SHOWN ON THE PLANS, WILL BE CONSIDERED UNAUTHORIZED AND AT THE EXPENSE OF THE CONTRACTOR.

F. THE CONTRACTOR'S ATTENTION IS INVITED TO THE FACT THAT CONRAIL FORCES MAY BE DOING ROADWAY, SIGNAL, COMMUNICATION AND TRACK WORK AT THE SITE. COOPERATION WITH THESE FORCES WILL BE REQUIRED TO EXPEDITE THE WORK. IT SHALL BE THE RESPONSIBILITY OF THE PROJECT ENGINEER TO COORDINATE THE WORK TO OBTAIN THE DESIRED RESULTS.

1.02 PROTECTION

A. INSPECTION OF THE SITE WILL REVEAL THAT THE WORK IS IN A RAILROAD YARD ADJACENT TO ACTIVE TRACKS. IT IS IMPERATIVE THAT CARE AND NECESSARY PRECAUTIONS BE TAKEN AT ALL TIMES TO SAFEGUARD AND PROTECT THE PUBLIC, RAILROAD OPERATIONS, AND ALL WORKMEN, EQUIPMENT, AND PROPERTY.

B. THE CONTRACTOR SHALL PROVIDE ALL THE NECESSARY BARRICADES, WARNING DEVICES, SHEETING, AND SHORING, ETC., REQUIRED TO ADEQUATELY PROTECT EXISTING TRACKS AND FACILITIES FROM DAMAGE, AND TO ADEQUATELY WARN AND PROTECT RAILROAD PERSONNEL AND ALL WORKMEN FROM BODILY INJURY DURING THE ENTIRE DURATION OF THE PROJECT.

C. PROTECTION OF THE CONTRACTOR'S EQUIPMENT AND MATERIAL SHALL BE SOLELY THE CONTRACTOR'S RESPONSIBILITY.

D. THE COST OF THE PROTECTION SHALL BE INCLUDED IN THE BID PRICES SUBMITTED IN THE PROPOSAL.

E. THE CONTRACTOR SHALL REMOVE ALL PROTECTION WHEN THE

WORK IS COMPLETE AND WHEN AUTHORIZED TO DO SO BY THE PROJECT ENGINEER.

F. CONRAIL HAS THE RIGHT TO REQUIRE THE CONTRACTOR TO IMPROVE PROTECTIONS OR ALLEVIATE CONDITIONS WHICH CONRAIL DEEMS INADEQUATE OR INSUFFICIENT TO PROVIDE FOR THE PROTECTION OF ITS FACILITIES AND ITS EMPLOYEES. HOWEVER, NOTHING IN THIS PARAGRAPH SHALL RELIEVE THE CONTRACTOR FROM PROVIDING THE PROTECTION NECESSARY FOR THE SAFE OPERATION OF CONRAIL'S FACILITIES AND THE SAFETY OF CONRAIL EMPLOYEES.

G. DURING ALL CONSTRUCTION WITHIN CONRAIL'S RIGHT OF WAY AND ALL CONSTRUCTION NEAR THE RIGHTS OF WAY WHICH CONCERNS RAILROAD OPERATIONS, THE CONTRACTOR'S WORK SHALL BE PERFORMED IN SUCH A MANNER THAT THE TRACKS, TRAFFIC, APPURTENANCES AND ALL FACILITIES OF CONRAIL WILL BE SAFEGUARDED.

H. THE CONTRACTOR'S PERSONNEL OR EQUIPMENT SHALL NOT APPROACH WITHIN 20 FEET OF NEAREST TRACK RAIL OF ALL TRACK ON THE PROJECT WITHOUT FIRST RECEIVING APPROVAL OF THE PROJECT ENGINEER AT THE JOB SITE.

I. THE CONTRACTOR SHALL PROVIDE AND ASSUME ALL RESPONSIBILITY FOR CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS, AS REQUIRED BY THE GOVERNING LAWS, REGULATIONS AND ORDINANCES, AND AS REQUIRED IN THE CONTRACT DOCUMENTS DURING THE PROGRESS OF THE WORK.

J. ALL ACTIVE RAILROAD OPERATING FACILITIES, INCLUDING ELECTRICAL, WATER LINES, SEWER LINES, ALL UNDERGROUND PIPING, COMMUNICATIONS AND SIGNAL LINES, ETC., SHALL BE PROTECTED DURING EXCAVATION AND NEW CONSTRUCTION AS REQUIRED.

K. THE CONTRACTOR IS REQUIRED TO HAVE FLAGGING PROTECTION PROVIDED AT LOCATIONS WHERE TEMPORARY CONSTRUCTION GRADE CROSSINGS ARE USED TO ACCESS THE CONSTRUCTION SITE AS DIRECTED BY THE PROJECT ENGINEER.

1.03 TEMPORARY OFFICE

A. THE CONTRACTOR SHALL PROVIDE, IN AN AREA DESIGNATED BY CONRAIL, A TEMPORARY OFFICE TRAILER FOR THE EXCLUSIVE USE OF THE PROJECT ENGINEER(S).

B. THE OFFICE TRAILER SHALL BE WEATHERPROOF, HEATED AND AIR CONDITIONED (AS NECESSARY), ADEQUATELY LIGHTED, EQUIPPED WITH SUITABLE FURNITURE (INCLUDING TWO (2) DESKS, FOUR (4) CHAIRS, TWO (2) PLAN TABLES, A PLAN STORAGE RACK, AND A FOUR (4) DRAWER FIRE RESISTANT FILE CABINET WITH LOCK AND KEY, ETC.), AND FURNISHED WITH TELEPHONE SERVICE, A CALCULATOR, A FAX MACHINE, AND COPYING MACHINE.

C. THE OFFICE TRAILER SHALL HAVE A GROSS AREA OF NOT LESS THAN 400 SQUARE FEET AND SHALL BE EQUIPPED WITH LOCKABLE WINDOWS AND HAVE A PRIVATE ENTRANCE SECURED BY LOCK AND KEY.

D. INTERIOR SANITARY FACILITIES (INCLUDING RUNNING WATER, ETC.) SHALL BE MAINTAINED WITHIN THE OFFICE TRAILER FOR THE EXCLUSIVE USE OF THE PROJECT ENGINEER(S). ALSO, POTABLE WATER FOR DRINKING, WHICH IS COOLED, SHALL BE SUPPLIED.

E. THE OFFICE TRAILER WILL BE PAID FOR IN ACCORDANCE WITH CONSOLIDATED RAIL CORPORATION PAYMENT TERMS, UTILIZING THE APPLICABLE CONTRACTUAL PRICE AS A BASIS FOR PAYMENT(S). SAID PRICE SHALL INCLUDE FACTORS TO COVER ALL MATERIALS, LABOR, EQUIPMENT, RENTAL FEES, CLEANING COSTS, UTILITY COSTS AND UPKEEP, ETC., REQUIRED TO PROPERLY PROVIDE THE AFOREMENTIONED TEMPORARY OFFICE FACILITIES UNTIL THE PROJECT IS COMPLETED AND FULLY ACCEPTED.

1.04 HANDLING OF MATERIALS

A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER CARE AND PROTECTION OF ALL OF ITS MATERIALS, EQUIPMENT, ETC., DELIVERED ON THE SITE. MATERIALS, CONTRACTOR'S EQUIPMENT, ETC., MAY BE STORED ON THE

PREMISES, BUT THE PLACING OF SAME SHALL BE SUBJECT TO THE APPROVAL OF CONRAIL.

B. THE CONTRACTOR SHALL PROTECT AND BE RESPONSIBLE FOR ALL DAMAGE TO ITS WORK OR MATERIALS, FROM THE DATE OF THE CONTRACT UNTIL THE ACCEPTANCE BY CONRAIL, AND SHALL MAKE GOOD, WITHOUT ANY COST TO CONRAIL, ALL DAMAGE OR LOSS THAT MAY OCCUR DURING THIS PERIOD.

1.05 DUST CONTROL

DESCRIPTION

A. UNDER THIS ITEM, THE CONTRACTOR SHALL PAY FOR AND APPLY ALL THE NECESSARY METHODS TO CONTROL DUST ON THE JOB SITE. DUST CONTROL IS APPLICABLE IN ALL AREAS OF EXCAVATION, ROADWAYS (TEMPORARY AND PERMANENT) AND ALL OTHER AREAS WITHIN THE LIMITS OF THE WORK.

B. THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR ALL SUITS OR DAMAGE ARISING FROM DUST.

EXECUTION

C. THE CONTRACTOR SHALL CONTROL DUST BY SPRINKLING ALL DUST PRONE SURFACES WITH WATER OR SUITABLE CHEMICALS AS DIRECTED BY THE PROJECT ENGINEER AND IN COMPLIANCE WITH ALL LOCAL ORDINANCES.

1.06 EROSION AND SEDIMENTATION CONTROL

DESCRIPTION

A. THE CONTRACTOR SHALL PAY FOR AND APPLY THE NECESSARY METHODS AND MEASURES TO CONTROL EROSION AND MINIMIZE SILTATION OF RIVERS, STREAMS, LAKES, RESERVOIRS AND OTHER NATURAL AND ARTIFICIAL WATERWAYS THROUGHOUT THE PROGRESS OF THE WORK.

B. METHODS AND MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BERMS, DIKES, DAMS, SEDIMENT BASINS,

SEDIMENT TRAPS, FILTERS, FIBER MATS, NETTING, GRAVEL, OR CRUSHED STONE, MULCH, GRASS, SLOPE DRAINS, SEEDING, ETC.

QUALITY ASSURANCE

C. NO DEMOLITION, CLEARING, GRUBBING AND GRADING MAY COMMENCE UNTIL THE CONTRACTOR HAS PREPARED SEDIMENT AND EROSION CONTROL PLANS WHICH MUST MEET APPLICABLE FEDERAL, STATE AND LOCAL AGENCY STANDARDS. SHOULD FEDERAL, STATE AND LOCAL REGULATIONS DIFFER, THE STRICTEST REGULATION SHALL GOVERN.

D. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO SECURE ALL NECESSARY PERMITS BEFORE DEMOLITION, CLEARING, GRUBBING AND GRADING MAY BEGIN.

E. STRUCTURAL METHODS SHALL CONFORM TO THE PUBLICATION "STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL IN DEVELOPING AREAS", JULY, 1975, AS AMENDED, SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE.

SUBMITTALS

F. SEDIMENT AND EROSION CONTROL PLANS INCLUDING A CONSTRUCTION SCHEDULE FOR EROSION CONTROL SHALL BE SUBMITTED TO CONRAIL FOR REVIEW AND APPROVAL BEFORE ANY WORK IS BEGUN.

EXECUTION

G. THE CONTRACTOR SHALL CONTROL EROSION BY PLANNING AND SCHEDULING CONSTRUCTION OPERATIONS CAREFULLY.

H. AS SOON AS POSSIBLE DURING THE PROGRESS OF THE GRADING WORK, THE PERMANENT DRAINAGE STRUCTURES SHALL BE CONSTRUCTED IN ORDER TO COORDINATE EROSION AND SEDIMENT CONTROL MEASURES WITH THE FINAL SYSTEM, TO ACHIEVE AN ECONOMICAL, CONTINUOUS AND EFFECTIVE EROSION AND SEDIMENTATION CONTROL PROGRAM.

I. METHODS AND MEASURES OF EROSION CONTROL SHALL BE APPLIED TO ERODIBLE MATERIAL EXPOSED DURING THE PROGRESS OF THE WORK. ERODIBLE AREAS UPON WHICH WORK IS SUSPENDED, SHALL BE STABILIZED TO PROTECT AGAINST EROSION UNTIL FINAL EROSION CONTROL METHODS AND MEASURES ARE APPLIED.

J. NO MORE CLEARING, GRUBBING AND GRADING OF ERODIBLE EARTH MATERIAL SURFACE AREA SHALL BE EXPOSED AT ANY LOCATION THAN CAN BE EFFECTIVELY CONTROLLED BY THE CONTRACTOR'S PROPOSED EROSION CONTROL SYSTEM.

**** STRUCTURES SPECIAL CONDITION: ****

1.07 ENVIRONMENTAL PROTECTION

A. SCOPE: THE WORK COVERED BY THIS SECTION CONSISTS OF FURNISHING ALL LABOR, MATERIALS AND EQUIPMENT AND PERFORMING ALL WORK REQUIRED FOR THE PREVENTION OF ENVIRONMENTAL POLLUTION DURING AND AS A RESULT OF CONSTRUCTION OPERATIONS UNDER THE CONTRACT, EXCEPT FOR THOSE MEASURES SET FORTH IN OTHER TECHNICAL PROVISIONS OF THESE SPECIFICATIONS. FOR THE PURPOSE OF THIS SPECIFICATION, ENVIRONMENTAL POLLUTION IS DEFINED AS THE PRESENCE OF CHEMICAL, PHYSICAL OR BIOLOGICAL ELEMENTS OR AGENTS WHICH ADVERSELY AFFECT HUMAN HEALTH OR WELFARE; UNFAVORABLY ALTER ECOLOGICAL BALANCE OF IMPORTANCE TO HUMAN LIFE; AFFECT OTHER SPECIES OF IMPORTANCE TO MAN; OR DEGRADE THE UTILITY OF THE ENVIRONMENT FOR AESTHETIC AND RECREATIONAL PURPOSES. THE CONTROL OF ENVIRONMENTAL POLLUTION REQUIRES CONSIDERATION OF AIR, WATER AND LAND, AND INVOLVES NOISE, SOLID WASTE MANAGEMENT AND MANAGEMENT OF RADIANT ENERGY AND RADIOACTIVE MATERIALS, AS WELL AS OTHER POLLUTANTS.

B. APPLICABLE REGULATIONS: IN ORDER TO PREVENT AND TO PROVIDE FOR ABATEMENT AND CONTROL OF ALL ENVIRONMENTAL POLLUTION ARISING FROM THE CONSTRUCTION ACTIVITIES OF THE CONTRACTOR, THEY SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAW, AND REGULATIONS CONCERNING ENVIRONMENTAL POLLUTION CONTROL AND ABATEMENT, AND ALL APPLICABLE PROVISIONS OF THE CORPS OF ENGINEERS'

MANUAL, EM 385-1-1, ENTITLED "GENERAL SAFETY REQUIREMENTS", IN EFFECT ON THE DATE OF SOLICITATION, AS WELL AS THE SPECIFIC REQUIREMENTS STATED ELSEWHERE IN THE CONTRACT SPECIFICATIONS.

C. NOTIFICATION: THE ENGINEER WILL NOTIFY THE CONTRACTOR IN WRITING OF ALL NON-COMPLIANCE WITH THE FOREGOING PROVISIONS AND THE ACTION TO BE TAKEN. THE CONTRACTOR SHALL, AFTER RECEIPT OF SUCH NOTICE, IMMEDIATELY TAKE CORRECTIVE ACTION. SUCH NOTICE, WHEN DELIVERED TO THE CONTRACTOR OR ITS AUTHORIZED REPRESENTATIVE AT THE SITE OF THE WORK, SHALL BE DEEMED SUFFICIENT FOR THE PURPOSE. IF THE CONTRACTOR FAILS OR REFUSES TO COMPLY PROMPTLY, THE ENGINEER MAY ISSUE AN ORDER STOPPING ALL OR PART OF THE WORK UNTIL SATISFACTORY CORRECTIVE ACTION HAS BEEN TAKEN. NO PART OF THE TIME LOST DUE TO ANY SUCH STOP ORDERS SHALL BE MADE SUBJECT OF A CLAIM FOR EXTENSION OF TIME OR FOR EXCESS COSTS OR DAMAGES BY THE CONTRACTOR UNLESS IT WAS LATER DETERMINED THAT THE CONTRACTOR WAS IN COMPLIANCE.

D. SUBCONTRACTORS: COMPLIANCE WITH THE PROVISIONS OF THIS SECTION BY SUBCONTRACTORS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

E. IMPLEMENTATION: PRIOR TO COMMENCEMENT OF THE WORK, THE CONTRACTOR WILL:

1. SUBMIT IN WRITING ITS PROPOSALS FOR IMPLEMENTING THIS SECTION FOR ENVIRONMENTAL POLLUTION CONTROL;
2. MEET WITH THE ENGINEER TO DEVELOP MUTUAL UNDERSTANDINGS RELATIVE TO COMPLIANCE WITH THIS PROVISION AND ADMINISTRATION OF THE ENVIRONMENTAL POLLUTION CONTROL PROGRAM.

F. LOCATION OF CONSTRUCTION FACILITIES: THE LOCATION ON COMPANY PROPERTY OF THE CONTRACTOR'S STORAGE AND OTHER CONSTRUCTION BUILDINGS, REQUIRED TEMPORARILY IN THE PERFORMANCE OF THE WORK, SHALL REQUIRE WRITTEN

APPROVAL OF THE ENGINEER. THE PRESERVATION OF THE LANDSCAPE SHALL BE AN IMPERATIVE CONSIDERATION IN THE SELECTION OF THE SITE AND IN THE CONSTRUCTION OF BUILDINGS. PLANS SHOWING STORAGE AND OTHER CONSTRUCTION FACILITIES SHALL BE SUBMITTED FOR APPROVAL OF THE ENGINEER.

G. PROTECTION OF WATER RESOURCES:

1. GENERAL: THE CONTRACTOR SHALL NOT POLLUTE ANY WATERWAY WITH FUEL, OILS, BITUMENS, CALCIUM CHLORIDE, ACIDS OR HARMFUL MATERIALS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INVESTIGATE AND COMPLY WITH ALL APPLICABLE FEDERAL, STATE, COUNTY AND MUNICIPAL LAWS CONCERNING POLLUTION OF RIVERS AND STREAMS. ALL WORK UNDER THIS CONTRACT SHALL BE PERFORMED IN SUCH A MANNER THAT OBJECTIONABLE CONDITIONS WILL NOT BE CREATED IN STREAMS THROUGH OR ADJACENT TO THE PROJECT AREA.
2. SPILLAGES: AT ALL TIMES OF THE YEAR, SPECIAL MEASURES SHALL BE TAKEN TO PREVENT CHEMICALS, FUELS, OILS, GREASES, BITUMINOUS MATERIALS, WASTE WASHINGS, HERBICIDES AND INSECTICIDES, AND CEMENT AND SURFACE DRAINAGE FROM ENTERING PUBLIC WATERS.
3. DISPOSAL: DISPOSAL OF ALL MATERIALS, WASTES, EFFLUENTS, TRASH, GARBAGE, OIL, GREASE, CHEMICALS, ETC., IN AREAS ADJACENT TO STREAMS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER FOR REASONS SIMILAR TO THOSE STATED ABOVE. IF ANY WASTE MATERIAL IS DUMPED IN UNAUTHORIZED AREAS, THE CONTRACTOR SHALL REMOVE THE MATERIAL AND RESTORE THE AREA TO THE CONDITION OF THE ADJACENT UNDISTURBED AREA. IF NECESSARY, CONTAMINATED GROUND SHALL BE EXCAVATED, DISPOSED OF AS DIRECTED BY THE ENGINEER, AND REPLACED WITH SUITABLE FILL MATERIAL, COMPACTED AND FINISHED WITH TOPSOIL, ALL AT THE EXPENSE OF THE CONTRACTOR.

H. DUST CONTROL: THE CONTRACTOR WILL BE REQUIRED TO MAINTAIN ALL HAUL ROADS, PERMANENT ACCESS ROADS, AND ALL OTHER WORK AREAS WITHIN OR WITHOUT THE PROJECT BOUNDARIES FREE FROM DUST WHICH WOULD CAUSE THE STANDARDS FOR AIR POLLUTION APPLICABLE TO THE PROJECT AREA TO BE EXCEEDED OR WHICH WOULD CAUSE A HAZARD OR NUISANCE TO OTHERS. APPROVED TEMPORARY METHODS OF STABILIZATION CONSISTING OF SPRINKLING, CHEMICAL TREATMENT OR SIMILAR METHODS WILL BE PERMITTED TO CONTROL DUST. SPRINKLING, TO BE APPROVED, MUST BE REPEATED AT SUCH INTERVALS AS TO KEEP ALL PARTS OF THE DISTURBED AREA AT LEAST DAMP AT ALL TIMES, AND THE CONTRACTOR MUST HAVE SUFFICIENT COMPETENT EQUIPMENT ON THE JOB TO ACCOMPLISH THIS IF SPRINKLING IS USED. DUST CONTROL SHALL BE PERFORMED AS THE WORK PROCEEDS AND WHENEVER A DUST NUISANCE OR HAZARD OCCURS. NO SEPARATE OR DIRECT PAYMENT WILL BE MADE FOR DUST CONTROL, AND THE COST THEREOF SHALL BE CONSIDERED INCIDENTAL TO AND INCLUDED IN THE CONTRACT PRICES FOR EXCAVATION AND EMBANKMENTS.

**** STRUCTURES SPECIAL CONDITION: ****

1.08 SAFETY AND MOVEMENT OF TRAINS

A. SAFETY AND CONTINUITY OF OPERATION OF TRAINS SHALL BE OF THE FIRST IMPORTANCE. THE CONTRACTOR SHALL ARRANGE ITS WORK SO THE TRAINS WILL BE PROTECTED AND SAFEGUARDED AT ALL TIMES. WHENEVER THE WORK MAY AFFECT THE SAFETY AND MOVEMENT OF TRAINS, THE METHOD, SEQUENCE AND TIME SCHEDULE OF DOING SUCH WORK SHALL BE SUBMITTED TO THE CHIEF ENGINEER OF CONSOLIDATED RAIL CORPORATION OR HIS DULY AUTHORIZED REPRESENTATIVE FOR APPROVAL. NO SUCH WORK SHALL BE STARTED NOR PROCEED WITHOUT THIS APPROVAL. BUT, THE APPROVAL OF THE CHIEF ENGINEER OF CONSOLIDATED RAIL CORPORATION OR HIS DULY AUTHORIZED REPRESENTATIVE WILL NOT BE CONSIDERED AS A RELEASE FROM RESPONSIBILITY FOR ALL DAMAGE TO CONSOLIDATED RAIL CORPORATION BY THE ACTS OF THE CONTRACTOR OR THOSE OF ITS EMPLOYEES.

B. DURING THE CONSTRUCTION PERIOD, THE CONTRACTOR

SHALL ESTABLISH COORDINATION WITH THE CONSOLIDATED RAIL CORPORATION FOR THE PROTECTION OF THE RAILROAD TRAFFIC AND THE CONSTRUCTION AS SHOWN ON THE PLAN. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF CONSOLIDATED RAIL CORPORATION A SUFFICIENT TIME IN ADVANCE OF THE WORK TO ASSURE THAT THE NECESSARY ARRANGEMENTS ARE MADE TO PROPERLY PROTECT THE RAILROAD TRAFFIC.

C. THE RESPONSIBILITY FOR COOPERATION BETWEEN CONSOLIDATED RAIL CORPORATION AND THE CONTRACTOR IN THE MAINTENANCE OF RAILROAD TRAFFIC WILL BE ENTIRELY UPON THE CONTRACTOR, AND NO CLAIMS MAY BE MADE AGAINST THE CONSOLIDATED RAIL CORPORATION FOR DELAYS OR ANY OTHER INTERFERENCE THAT MAY HAVE CAUSED THE CONTRACTOR'S OPERATIONS TO BE DELAYED IN CONNECTION WITH ANY WORK UNDER THE CONTRACT.

**** STRUCTURES SPECIAL CONDITION: ****

1.09 SIDE AND VERTICAL CLEARANCES

A. THE CONTRACTOR SHALL OBTAIN THE WRITTEN APPROVAL OF THE CHIEF ENGINEER OF THE CONSOLIDATED RAIL CORPORATION, IN RESPECT TO THE METHODS THAT WILL BE EMPLOYED IN THE CONSTRUCTION OF THE SUBJECT PROJECT, TO THE HORIZONTAL AND VERTICAL TRACK CLEARANCES THAT MUST BE MAINTAINED AT ALL TIMES, AND TO ANY ACTIVITIES OF THE CONTRACTOR THAT MAY AFFECT THE OPERATION AND MAINTENANCE OF THE RAILROAD FACILITIES. THIS PROVISION MUST BE COMPLIED WITH BEFORE THE CONTRACTOR BEGINS ACTUAL CONSTRUCTION WORK. THE CONTRACTOR SHALL TAKE SPECIAL CARE AND VIGILANCE TO AVOID DAMAGE TO TRAINS, TRACKS OR OTHER FACILITIES OF THE RAILROAD AND SHALL CONDUCT ITS WORK SO AS NOT TO INTERFERE WITH THE MOVEMENT OF TRAINS OR OTHER OPERATIONS OF THE COMPANY. WHENEVER WORK MAY AFFECT THE SAFETY AND MOVEMENT OF TRAINS, THE METHOD OF DOING THE WORK SHALL FIRST BE SUBMITTED TO THE ENGINEER FOR HIS APPROVAL, AND NO WORK AFFECTING SUCH SAFETY OR MOVEMENT OF TRAINS SHALL BE COMMENCED OR PROSECUTED UNTIL WRITTEN APPROVAL OF THE CHIEF ENGINEER IS OBTAINED. IF, DURING THE CARRYING OUT OF THE WORK COVERED BY THIS CONTRACT, THE TRACKS OR OTHER FACILITIES OF THE COMPANY ARE ENDANGERED,

THE CONTRACTOR SHALL IMMEDIATELY DO SUCH WORK AS DIRECTED BY THE ENGINEER TO RESTORE SAFETY AND, UPON FAILURE OF THE CONTRACTOR TO CARRY OUT SUCH ORDERS IMMEDIATELY, THE COMPANY MAY TAKE WHATEVER STEPS ARE NECESSARY TO RESTORE SAFE CONDITIONS. THE COST AND EXPENSE TO THE COMPANY FOR RESTORING SAFE CONDITIONS OR OF ANY DAMAGE TO THE COMPANY'S TRAINS, TRACKS OR OTHER FACILITIES CAUSED BY THE CONTRACTOR'S OPERATIONS, SHALL BE CONSIDERED A CHARGE AGAINST THE CONTRACTOR AND SHALL BE PAID FOR BY IT, OR MAY BE DEDUCTED FROM ANY MONEYS DUE OR THAT BECOME DUE UNDER THE CONTRACT. APPROVAL OF THE ENGINEER SHALL NOT ABSOLVE THE CONTRACTOR FROM ANY LIABILITY RESULTING FROM ITS OPERATIONS.

B. THE CONTRACTOR SHALL CONDUCT ITS WORK AND HANDLE ITS EQUIPMENT SO THAT NO PART OF ANY MATERIAL OR EQUIPMENT SHALL FOUL AN OPERATED TRACK WITHOUT WRITTEN PERMISSION OF THE ENGINEER. WHEN THE CONTRACTOR'S OPERATIONS NECESSITATE THE FOULING OF AN OPERATED TRACK, IT MUST GIVE THE ENGINEER AT LEAST EIGHT (8) DAYS' NOTICE, IN WRITING, OF ITS INTENTIONS SO THAT, IF APPROVED, ARRANGEMENTS CAN BE MADE FOR PROPER PROTECTION. ABSOLUTE MINIMUM, TEMPORARY CLEARANCES SHALL BE AS FOLLOWS:

1. SIDE CLEARANCE SHALL BE 8'-6" FROM THE CENTER-LINE OF TRACK UNLESS IT IS LOWER THAN THE TOP OF RAIL OR OTHERWISE SHOWN ON THE PLAN.
2. VERTICAL UNDER CLEARANCE SHALL BE 22'-6" FROM THE TOP OF RAIL UNLESS OTHERWISE SHOWN ON THE PLAN.

C. CRANES AND OTHER EQUIPMENT SHALL BE CONSIDERED AS FOULING A TRACK WHENEVER THEY ARE LOCATED IN SUCH A POSITION THAT FAILURE OF THE CRANE OR OTHER EQUIPMENT, WITH OR WITHOUT LOAD, WOULD BRING ANY PART OF THE EQUIPMENT WITHIN THE FOULING LIMITS OF THE TRACK.

D. THE CONTRACTOR SHALL CONDUCT ITS WORK SO THAT THE

SCHEDULED SPEEDS CAN BE MAINTAINED ON THE RAILROAD, UNLESS PERMISSION IS RECEIVED FROM THE ENGINEER FOR REDUCED SPEED.

E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF THE WORK OF ITS VARIOUS SUBCONTRACTORS, WHO, IN TURN, SHALL COOPERATE WITH THE COMPANY.

F. THE COST OF COMPLIANCE WITH THESE REQUIREMENTS SHALL BE INCLUDED IN THE APPLICABLE PRICE(S) BID FOR THE VARIOUS ITEM(S) OF WORK IN THE CONTRACT.

*** USE THE FOLLOWING ARTICLE ON TESTING REQUIREMENTS FOR *****
*** SPECIAL OCCASIONS ONLY

1.10 TESTING REQUIREMENTS

A. THE CONTRACTOR SHALL EMPLOY THE SERVICES OF A QUALIFIED TESTING LAB, ACCEPTABLE TO CONRAIL, FOR SOIL TESTING AND BITUMINOUS CONCRETE TESTING ON THE PROJECT. CONRAIL WILL REIMBURSE THE CONTRACTOR FOR THESE TESTING SERVICES AT ACTUAL COSTS PLUS 4 PERCENT MARKUP AS EVIDENCED BY ACTUAL INVOICE. THE CONTRACTOR SHALL SUBMIT THE PROPOSED TESTING CONTRACT TO THE ENGINEER FOR APPROVAL, PRIOR TO EXECUTING THE CONTRACT. THE TESTING CONTRACT SHALL BE BASED ON A DAILY RATE TO PROVIDE THE FOLLOWING SERVICES:

THE MODIFIED PROCTOR TEST, ASTM D-1557-78, SHALL BE USED TO ESTABLISH THE APPROPRIATE LIMITS FOR THE MAXIMUM DENSITY AND FOR THE OPTIMUM MOISTURE CONTENT FOR EACH MATERIAL USED OR ENCOUNTERED. RELATIVE DENSITY TEST, ASTM D-4253-83, MAY BE SPECIFIED AS AN ALTERNATIVE.

THE INPLACE DENSITY OF COMPACTED SUBGRADE AND AGGREGATE BASE COURSE MATERIALS SHALL BE TESTED USING THE NUCLEAR DIRECT TRANSMISSION TEST, ASTM D-2922-81 (METHOD B). THE IN-PLACE MOISTURE CONTENT OF THE SOIL AND AGGREGATE BASE COURSE SHALL BE DETERMINED BY USING ASTM D-3017. FOR AGGREGATE BASE COURSE, A MINIMUM OF ONE (1) TEST PER LIFT (NOT TO EXCEED 5000 SQUARE FEET) SHALL BE PERFORMED.

B. THE ENGINEER RESERVES THE RIGHT TO REQUIRE CBR TESTS ON THE SUBGRADE IN ACCORDANCE WITH ASTM D 1883-73 (78) DEPENDING ON THE EXISTING SUBGRADE CONDITIONS.

C. A GRADATION TEST SHALL BE PERFORMED IN ACCORDANCE WITH CURRENT ASTM C-136 FOR EACH 600 TONS OF AGGREGATE BASE COURSE MATERIAL PLACED OR A MINIMUM OF EVERY HALF DAY'S PLACEMENT PRODUCTION. A GRADATION TEST IN ACCORDANCE WITH ASTM C-136 SHALL ALSO BE PERFORMED TO ACCOMPANY EACH MODIFIED PROCTOR TEST, ASTM D-1557-78.

D. THE ENGINEER WILL SELECT RANDOM LOCATIONS FOR PERFORMANCE OF DENSITY TESTS, ASTM D-2950, BACKSCATTER METHOD, WHEN PLACING BITUMINOUS CONCRETE. MARSHALL TESTS USING ASTM D-1559 SHALL ALSO BE PERFORMED WHEN SO DIRECTED BY THE ENGINEER.

* CONSTRUCTION

x

SECTION 01050
CONTRACT (PROJECT) CLOSEOUT
-----PART 1 - GENERAL

1.01 CLEAN-UP

A. THE CONTRACTOR SHALL CLEAN UP AND REMOVE ALL RUBBISH AND KEEP THE PREMISES CLEAN AND FREE OF SURPLUS MATERIAL AND EQUIPMENT (UNLESS OTHERWISE DETERMINED BY THE PROJECT ENGINEER). ALL WORK ON COMPLETION OF THE PROJECT SHALL BE DELIVERED CLEAN TO THE SATISFACTION OF THE PROJECT ENGINEER.

1.02 SUBSTANTIAL COMPLETION

A. CONTRACTOR SHALL:

1. SUBMIT WRITTEN CERTIFICATION AT THE TIME OF COMPLETION TO CHIEF ENGINEER, THAT PROJECT, OR DESIGNATED PORTION OF PROJECT, IS COMPLETE.

2. AT THE TIME OF THE SUBMITTAL IN PARAGRAPH 1 ABOVE, SUBMIT LIST OF ITEMS TO BE COMPLETED OR CORRECTED.

B. PROJECT ENGINEER WILL MAKE AN INSPECTION WITHIN SEVEN (7) DAYS AFTER RECEIPT OF CERTIFICATION, TOGETHER WITH CONTRACTOR'S REPRESENTATIVE.

C. SHOULD CHIEF ENGINEER CONSIDER THAT WORK IS SUBSTANTIALLY COMPLETE:

1. CONTRACTOR SHALL PREPARE, AND SUBMIT TO CHIEF ENGINEER, A LIST OF ITEMS TO BE COMPLETED OR CORRECTED AS DETERMINED BY THE INSPECTION.

2. CHIEF ENGINEER WILL PREPARE AND ISSUE A CERTIFICATE OF SUBSTANTIAL COMPLETION, CONTAINING:

- A. DATE OF SUBSTANTIAL COMPLETION.
- B. CONTRACTOR'S LIST OF ITEMS TO BE COMPLETED OR CORRECTED, AS VERIFIED AND/OR AMENDED BY CHIEF ENGINEER.
- C. THE TIME WITHIN WHICH CONTRACTOR SHALL COMPLETE OR CORRECT WORK OF LISTED ITEMS.
- D. TIME AND DATE CONRAIL WILL ASSUME POSSESSION OF WORK OR DESIGNATED PORTION THEREOF.
- E. RESPONSIBILITIES OF CONRAIL AND CONTRACTOR FOR:
 - (1) INSURANCE.
 - (2) UTILITIES.
 - (3) OPERATION OF MECHANICAL, ELECTRICAL AND OTHER SYSTEMS.
 - (4) MAINTENANCE AND CLEANING.
 - (5) SECURITY.
 - (6) OCCUPANCY PERMIT.
- F. SIGNATURES OF:
 - (1) CHIEF ENGINEER
 - (2) CONTRACTOR

D. SHOULD CHIEF ENGINEER CONSIDER THAT WORK IS NOT SUBSTANTIALLY COMPLETE:

- 1. HE SHALL IMMEDIATELY NOTIFY CONTRACTOR, IN WRITING, STATING REASONS.
- 2. CONTRACTOR SHALL COMPLETE WORK, AND SEND SECOND WRITTEN NOTICE TO CHIEF ENGINEER, CERTIFYING THAT PROJECT, OR DESIGNATED PORTION OF PROJECT, IS SUBSTANTIALLY COMPLETE.
- 3. PROJECT ENGINEER WILL THEN REINSPECT WORK.

1.03 FINAL INSPECTION

A. CONTRACTOR SHALL SUBMIT WRITTEN CERTIFICATION THAT:

- 1. CONTRACT DOCUMENTS HAVE BEEN REVIEWED.

2. PROJECT HAS BEEN INSPECTED FOR COMPLIANCE WITH CONTRACT DOCUMENTS.

3. WORK HAS BEEN COMPLETED IN ACCORDANCE WITH CONTRACT DOCUMENTS.

4. EQUIPMENT AND SYSTEMS HAVE BEEN TESTED IN PRESENCE OF CONRAIL'S REPRESENTATIVE AND ARE OPERATIONAL.

5. PROJECT IS COMPLETED, AND READY FOR FINAL INSPECTION.

B. CHIEF ENGINEER WILL MAKE FINAL INSPECTION WITHIN SEVEN (7) DAYS AFTER RECEIPT OF CERTIFICATION.

C. SHOULD CHIEF ENGINEER CONSIDER THAT WORK IS FINALLY COMPLETE IN ACCORDANCE WITH REQUIREMENTS OF CONTRACT DOCUMENTS, HE SHALL REQUEST CONTRACTOR TO MAKE PROJECT CLOSEOUT SUBMITTALS.

D. SHOULD CHIEF ENGINEER CONSIDER THAT WORK IS NOT FINALLY COMPLETE:

1. HE SHALL NOTIFY CONTRACTOR, IN WRITING, STATING REASONS.

2. CONTRACTOR SHALL TAKE IMMEDIATE STEPS TO REMEDY THE STATED DEFICIENCIES, AND SEND SECOND WRITTEN NOTICE TO CHIEF ENGINEER CERTIFYING THAT WORK IS COMPLETE.

3. PROJECT ENGINEER WILL THEN REINSPECT WORK.

1.04 REINSPECTION COSTS

A. SHOULD PROJECT ENGINEER BE REQUIRED TO PERFORM REINSPECTIONS BECAUSE OF FAILURE OF WORK TO COMPLY WITH ORIGINAL CERTIFICATIONS OF CONTRACTOR, CONTRACTOR WILL COMPENSATE CONRAIL FOR SUCH ADDITIONAL SERVICES, INCLUDING CONRAIL'S CURRENT ADDITIVES, ETC.

1.05 CLOSEOUT SUBMITTALS

A. PROJECT RECORD DOCUMENTS SHALL CONFORM TO REQUIREMENTS OF SECTION 01060 BELOW.

B. OPERATION AND MAINTENANCE DATA SHALL CONFORM TO REQUIREMENTS OF SECTION 01070 BELOW.

1.06 INSTRUCTION OF CONRAIL PERSONNEL

A. CONTRACTOR SHALL INSTRUCT THE APPOINTED CONRAIL PERSONNEL IN THE OPERATION OF:

1. MECHANICAL SYSTEMS.

2. ELECTRICAL SYSTEMS.

3. CONTROL SYSTEMS.

B. THE INSTRUCTION SHALL BE COMPLETED BEFORE THE FINAL INSPECTION AND SHALL BE IN SUCH DETAIL AS TO EXPLAIN THE FUNCTIONAL OPERATION OF ALL SYSTEMS. SAID INSTRUCTION SHALL BE GIVEN WHILE THE EQUIPMENT IS OPERATIONAL AND AT OR NEAR THE INSTALLATION SITE.

1.07 EVIDENCE OF PAYMENT, AND RELEASE OF LIENS

A. CONTRACTOR SHALL PROVIDE (WITH, OR PRIOR TO, THE FINAL APPLICATION FOR PAYMENT) THE FOLLOWING:

1. AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS.

2. AFFIDAVIT OF RELEASE OF LIENS (ON FORMS SUPPLIED BY CONRAIL) WITH:

A. CONSENT OF SURETY FOR FINAL PAYMENT.

B. CONTRACTOR'S RELEASE OR WAIVER OF LIENS.

C. SEPARATE RELEASES OF WAIVERS OF LIENS FOR SUBCONTRACTORS, SUPPLIERS, AND OTHERS WITH LIEN RIGHTS AGAINST PROPERTY OF CONRAIL, TOGETHER WITH LIST OF THOSE PARTIES.

B. ALL SUBMITTALS SHALL BE DULY EXECUTED BEFORE DELIVERY TO CHIEF ENGINEER.

1.08 FINAL ADJUSTMENT OF ACCOUNTS

A. CONTRACTOR SHALL:

1. SUBMIT FINAL STATEMENT OF ACCOUNTING TO CHIEF ENGINEER.

2. INSURE THAT SAID STATEMENT SHALL REFLECT RELATED INFORMATION AND ALL ADJUSTMENTS, AS INDICATED BELOW:

A. THE ORIGINAL CONTRACT SUM(S).

B. ADDITIONS AND DEDUCTIONS (IF APPLICABLE) RESULTING FROM:

(1) PREVIOUS CHANGE STATEMENTS.

(2) CASH ALLOWANCES.

(3) UNIT PRICES.

(4) OTHER ADJUSTMENTS.

(5) DEDUCTIONS FOR UNCORRECTED WORK.

(6) PENALTIES AND BONUSES.

(7) DEDUCTIONS FOR LIQUIDATED DAMAGES.

(8) DEDUCTIONS FOR REINSPECTION PAYMENTS.

C. THE TOTAL CONTRACT SUM, AS ADJUSTED.

D. PREVIOUS PAYMENTS.

E. THE SUM REMAINING DUE.

1.09 POST-CONSTRUCTION INSPECTION

A. PRIOR TO EXPIRATION OF ONE YEAR FROM DATE OF FINAL CONTRACT PAYMENT, PROJECT ENGINEER WILL MAKE VISUAL INSPECTION OF PROJECT IN COMPANY WITH CONTRACTOR TO DETERMINE WHETHER CORRECTION OF WORK IS REQUIRED IN ACCORDANCE WITH PROVISIONS OF THE CONTRACT.

B. CONRAIL WILL PROMPTLY NOTIFY CONTRACTOR, IN WRITING, OF ANY OBSERVED DEFICIENCIES. THESE DEFICIENCIES MUST BE CORRECTED BY THE CONTRACTOR WITHIN 30 CALENDAR DAYS AFTER RECEIPT OF SAID NOTIFICATION. IN

THE EVENT THAT ANY MATERIAL REQUIRED TO CORRECT THESE DEFICIENCIES IS NOT AVAILABLE WITHIN THE 30 DAYS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY CONRAIL, IN WRITING, OF ALTERNATE CHOICES AND DELIVERY DATES FOR ALL SUCH MATERIALS.

* CONSTRUCTION

*

SECTION 01060
PROJECT RECORD DOCUMENTS
-----PART 1 - GENERAL

1.01 MAINTENANCE OF DOCUMENTS

A. CONTRACTOR SHALL:

1. MAINTAIN AT JOB SITE (OR NEARBY CONRAIL DESIGNATED OFFICE, IF NO SEPARATE PROJECT OFFICE IS MAINTAINED), ONE COPY OF:

- A. SPECIFICATIONS.
- B. ADDENDA & PROPOSAL FORMAT.
- C. APPROVED SHOP DRAWINGS.
- D. CONTRACT AND ALL CHANGE STATEMENTS THERETO.
- E. FIELD TEST RECORDS.
- F. CONRAIL SAFETY RULES AND PROCEDURES (R4, 12-90)

2. MAINTAIN THE RECORD DOCUMENTS IN AN UNSOILED AND SAFE MANNER. THE RECORD DOCUMENTS SHALL CONSIST OF THOSE ITEMS LISTED IN PARAGRAPHS B, C AND D OF ARTICLE 1.03 "RECORDING" BELOW.

3. MAKE RECORD DOCUMENTS AVAILABLE AT ALL TIMES FOR INSPECTION BY THE PROJECT ENGINEER.

1.02 MARKING DEVICES

A. CONTRACTOR SHALL USE COLORED PENCIL(S) OR FELT MARKING PEN(S) FOR MARKING, CONFORMING TO THE FOLLOWING COLOR CODE(S), EXCEPT AS SPECIFIED IN SUBPARAGRAPH 7 HEREIN:

- 1. BROWN FOR ARCHITECTURAL WORK.

2. BLACK FOR STRUCTURAL WORK.
3. BLUE FOR PLUMBING WORK.
4. ORANGE FOR HEATING, VENTILATING AND AIR CONDITIONING WORK.
5. GREEN FOR ELECTRICAL WORK.
6. RED FOR OTHER WRITTEN NOTATIONS.
7. WHERE TRACKWORK IS INVOLVED, THE FOLLOWING SHALL APPLY:
 - A. RED SHALL INDICATE TRACK REMOVAL.
 - B. GREEN SHALL INDICATE TRACK CONSTRUCTION.
 - C. YELLOW SHALL INDICATE TRACK SHIFTING, USING DASHED YELLOW FOR ORIGINAL LOCATION, AND SOLID YELLOW FOR NEW LOCATION.

1.03 RECORDING

A. CONTRACTOR SHALL:

1. LABEL EACH DOCUMENT "PROJECT RECORD" IN 2 INCH HIGH PRINTED LETTERS.
2. KEEP RECORD DOCUMENTS CURRENT ON A WEEKLY BASIS.
3. NOT PERMANENTLY COVER AND/OR MAKE INACCESSIBLE ANY WORK UNTIL REQUIRED INFORMATION HAS BEEN RECORDED.

B. CONTRACTOR SHALL LEGIBLY MARK CONTRACT DRAWINGS TO RECORD ACTUAL CONSTRUCTION, AS INDICATED BELOW:

1. SHOW DEPTHS OF VARIOUS ELEMENTS OF FOUNDATION IN RELATION TO FIRST FLOOR LEVEL.
2. GIVE HORIZONTAL AND VERTICAL LOCATIONS OF UNDERGROUND UTILITIES AND APPURTENANCES, REFERENCED TO PERMANENT SURFACE IMPROVEMENTS.

3. SHOW LOCATION OF INTERNAL UTILITIES AND APPURTENANCES CONCEALED IN CONSTRUCTION, REFERENCED TO VISIBLE AND ACCESSIBLE FEATURES OF STRUCTURE(S).

4. INDICATE FIELD CHANGES OF DIMENSION AND DETAIL.

5. SHOW CHANGES MADE BY CHANGE STATEMENT OR FIELD ORDER.

6. GIVE DETAILS NOT ON ORIGINAL CONTRACT DRAWINGS.

C. CONTRACTOR SHALL LEGIBLY MARK UP EACH SECTION OF SPECIFICATIONS AND/OR ADDENDA TO RECORD:

1. MANUFACTURER, TRADE NAME, CATALOG NUMBER, AND SUPPLIER TO EACH PRODUCT AND ITEM OF EQUIPMENT ACTUALLY INSTALLED.

2. CHANGES MADE BY CHANGE STATEMENT OR FIELD ORDER.

3. OTHER MATTERS NOT ORIGINALLY SPECIFIED.

D. SHOP DRAWINGS

1. CONTRACTOR SHALL MAINTAIN SHOP DRAWINGS AS RECORD DOCUMENTS; CONTRACTOR SHALL ALSO LEGIBLY ANNOTATE SUCH DRAWINGS TO RECORD ANY CHANGES MADE AFTER REVIEW.

2. CONTRACTOR SHALL RETAIN ALL DRAWINGS NEEDED FOR MAINTENANCE OR FUTURE ADDITIONS.

1.04 SUBMITTAL

A. IMMEDIATELY AFTER COMPLETION OF PROJECT, CONTRACTOR SHALL DELIVER RECORD DOCUMENTS TO CHIEF ENGINEER.

B. CONTRACTOR SHALL ACCOMPANY SUBMITTAL(S) WITH TRANSMITTAL LETTER, IN DUPLICATE, CONTAINING:

1. DATE.
2. PROJECT TITLE AND NUMBER.
3. CONTRACTOR'S NAME AND ADDRESS.
4. TITLE, NUMBER AND DATE OF EACH RECORD DOCUMENT.
5. CERTIFICATION THAT EACH DOCUMENT AS SUBMITTED IS COMPLETE AND ACCURATE.
6. SIGNATURE OF CONTRACTOR, OR ITS AUTHORIZED REPRESENTATIVE.

* CONSTRUCTION

*

SECTION 01070
OPERATION AND MAINTENANCE
-----PART 1 - GENERAL

1.01 GENERAL

A. MANUFACTURER'S MAINTENANCE MANUALS AND OPERATING INSTRUCTIONS ARE REQUIRED FOR EACH PIECE OF EQUIPMENT AND COMPONENT PART FOR WHICH THERE IS A SEPARATE MANUAL.

1.02 SUBMITTALS

A. CONTRACTOR SHALL SUBMIT EIGHT (8) COPIES OF ALL MAINTENANCE MANUALS AND OPERATING INSTRUCTIONS TO THE CHIEF ENGINEER ON DELIVERY OF EQUIPMENT.

B. PARTIAL SUBMITTALS WILL NOT BE ACCEPTED.

C. CONTRACTOR SHALL ACCOMPANY SUBMITTAL(S) WITH TRANSMITTAL LETTER, IN DUPLICATE, CONTAINING:

1. DATE.

2. PROJECT TITLE AND NUMBER.

3. CONTRACTOR'S NAME AND ADDRESS.

4. TITLE, NUMBER AND DATE OF EACH MANUAL.

5. EQUIPMENT IDENTIFICATION: NUMBER, LOCATION, MODEL NUMBER, SERIAL NUMBER, HORSEPOWER, ETC.

6. SIGNATURE OF CONTRACTOR, OR ITS AUTHORIZED REPRESENTATIVE.

CE-8
2/1/91

SPECIFICATIONS
FOR
PIPELINE OCCUPANCY
OF
CONSOLIDATED RAIL CORPORATION
PROPERTY

RECOMMENDED:

ACW
System Engineer
Design - Structures

APPROVED:

J. D. Cressel
Chief Engineer -
Design & Construction

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Specifications For Pipeline Occupancy Of Consolidated Rail Corporation Property

1.0 GENERAL

1.1 Scope

a. This specification shall apply to the design and construction of pipelines carrying flammable or non-flammable substances and casings containing wires and cables across and along Conrail property and facilities. This specification shall also apply to tracks owned by others (sidings, industry tracks, etc.) over which Conrail operates its equipment.

b. It is to be clearly understood that Conrail owns its right-of-way for the primary purpose of operating a railroad. All occupancies shall therefore be designed and constructed so that rail operations and facilities are not interfered with, interrupted or endangered. In addition, the proposed facility shall be located to minimize encumbrance to the right-of-way so that the railroad will have unrestricted use of its property for current and future operations.

1.2 Definitions

- a. Conrail - Consolidated Rail Corporation
- b. Chief Engineer - Conrail's Chief Engineer - Design & Construction or his designated representative
- c. Owner(Applicant) - Individual, corporation or municipality desiring occupancy of Conrail property.
- d. Professional Engineer - Engineer licensed in the state where the facilities are to be constructed.
- e. Carrier Pipe - Pipe used to transport the product.
- f. Casing Pipe - Pipe through which the carrier pipe is installed.

1.3 Application For Occupancy

a. Individuals, corporations or municipalities desiring occupancy of Conrail property by pipeline occupations must agree, upon approval of the engineering and construction details by the Chief Engineer, to execute an appropriate Conrail occupational agreement and pay any required fees and/or rentals specified therein.

b. The application for an occupancy shall be by letter addressed to the Chief Engineer - Design & Construction, Consolidated Rail Corporation, Room 1200, 15 North 32nd Street, Philadelphia, PA., 19104-2849, giving the following:

- (1) Full name of Owner.
- (2) Complete mailing address of the applicant.
- (3) Name and title of person who will sign the agreement.
- (4) The State in which the applicant is incorporated.

c. All applications shall be accompanied with six (6) copies of all design and construction plans and three (3) copies of all specifications and engineering computations for the proposed occupancy. On extensive projects, only those plans involving work on or affecting Conrail property and operations shall be submitted. Included shall be a plan showing the extent of the total project upon which that portion of the work affecting Conrail is clearly defined.

d. All of the above plans, specifications and computations must be prepared by and bear the seal of a Professional Engineer.

1.4 Right Of Entry

a. No entry upon Conrail property for the purpose of conducting surveys, field inspections, obtaining soils information or any other purposes associated with the design and construction for the proposed occupancy, will be permitted without a proper entry permit prepared by the Chief Engineer, or his designated representative. The applicant must pay the associated fees and execute the entry permit.

b. It is to be clearly understood that the issuance of an entry permit does not constitute authority to proceed with any construction. Construction can not begin until a formal agreement is executed by Conrail and the Owner receives permission, from the designated inspection agency of Conrail, to proceed with the work.

1.5 Site Inspection

a. For longitudinal occupancy of Conrail property a site inspection along the proposed pipeline route may be required before final design plans are prepared. When a site inspection is required, the applicant and/or his engineer must meet with representatives of the Chief Engineer's Office to view the entire length of the proposed occupancy.

b. Prior to the site inspection the applicant must submit the following information:

- (1) A plan view of the proposed route showing all tracks, both Conrail right-of-way lines and all other facilities located on the right-of-way. The distance from the proposed pipeline to the adjacent track and to the right-of-way lines must be shown.
- (2) A complete "Pipe Data Sheet" (See Plate I)
- (3) Typical cross sections along the proposed route. (See Plate V)

c. Site inspections for pipe crossings are not required unless, in the opinion of the Chief Engineer, the size and location of the facility warrant an inspection.

1.6 Information Required for Submission

1.6.1 Plans and Computations

a. Plans for proposed pipeline occupancies shall be submitted to and approved by the Chief Engineer prior to Conrail's issuance of an agreement and start of construction.

b. Plans are to be prepared in sizes as small as practical and shall be folded, individually, by the applicant to an 8 1/2 inch by 11 inch size, as shown on Plate X, prior to submission. Where more than one plan is involved, the folded plans shall be assembled into complete sets by the applicant before submission. Failure of the applicant to comply with these requirements may be sufficient cause for rejection of the application.

c. Plans shall be drawn to scale and shall include the following (See Plates I to VII):

- (1) Plan view of proposed pipeline in relation to all Conrail facilities and facilities immediately adjacent to Conrail including, but not limited to, tracks, buildings, signals, pole lines, other utilities and all other facilities that may affect or influence the pipeline design and construction. (See Plate II)
- (2) The location (in feet) of the pipe from the nearest Conrail Milepost and/or from the centerline of a Conrail bridge, giving the Conrail bridge number.
- (3) In all cases, the name of the State and County in which the proposed facilities are located must be shown. In States where Townships, Ranges and Sections are used, show the distance in feet to the nearest Section line and identify the Section number, Township and Range.

- (4) The profile of the ground above the centerline of the pipe, from field survey, showing relationship of the pipeline and/or casing pipe to the ground levels, the tracks and other facilities. (See Plate III)

For longitudinal occupations, the profile of the adjacent track, or tracks, shall be shown. (See Plate IV)

- (5) All Conrail property lines indicated by dimensions, in feet, to the centerline of adjacent track as well as the overall width of the Conrail right-of-way.

If the pipeline is in a public highway, the limits of the dedicated highway right-of-way, as well the limits of any paving, sidewalks etc., shall be defined, by dimensions in feet, from the centerline of the dedicated right-of-way.

- (6) The angle of the crossing in relation to the centerline of the track(s).
- (7) On pipelines having valves, the distance in feet along the pipeline from the crossing to the nearest valves and/or control stations.
- (8) A separate "Pipe Data Sheet" (See Plate I) shall be submitted on 8 1/2 inch by 11 inch sheet size for each crossing.

d. The plan shall be specific, on Conrail property and under tracks that are not on Conrail property, as to:

- (1) The method of installation. (See Section 5.1)
- (2) The size and material of the casing pipe.
- (3) The size and material of the carrier pipe.

These items can not have an alternative and any application that is received that indicates options in any of the above items will not be processed.

e. Once the application has been approved by the Chief Engineer, no variance from the plans, specifications, method of installation, construction, etc., as approved in the occupancy document, will be considered or permitted without the payment to Conrail of additional fees for the re-processing of the application.

f. All plans and computations associated with the work under the agreement shall be prepared by, and bear the seal of, a Professional Engineer. If not so imprinted, the application will be given no further consideration. This requirement also

applies to all data submitted by the Owner's contractor. Contractor's plans and computations which are not stamped will be returned and construction will not be permitted to proceed.

1.6.2 Specifications

a. Project specifications, for all work on and affecting the railroad right-of-way, shall be included with the submission. All pertinent requirements of this document shall be included.

1.7 Notification to Proceed with Construction

a. After approval of the engineering plans and specifications and execution of the occupational agreement, the Owner will be notified of the appropriate Conrail Area Engineer's Office which must be contacted prior to start of construction. The Area Engineer's Office will provide Conrail's inspection of the project and coordinate all other construction aspects of the project which relate to Conrail (flagging, track work, etc.).

b. The Area Engineer's Office must be notified a minimum of fourteen (14) working days prior to desired start of construction.

2.0 GENERAL REQUIREMENTS

2.1 Use of Casing Pipe

a. A casing pipe will be required for all pipeline crossings carrying oil, gas, petroleum products, or other flammable or highly volatile substances under pressure, and all non-flammable substances which, from their nature or pressure, as determined by the Chief Engineer, might cause damage if escaping on or near Conrail property.

b. For non-pressure sewer or drainage crossings where the installation can be made without interference to railroad operations, as determined by the Chief Engineer, the casing pipe may be omitted.

c. Pressure pipelines which do not cross under the track but are located within 25 feet of the centerline of any track or closer than 45 feet to nearest point of any bridge, building or other important structure shall be encased.

d. The casing pipe shall be laid across the entire width of the right-of-way, except where a greater length is required to comply with Section 4.2.1 f. of this specification, even though such extension is beyond the right-of-way.

2.2 Location of Pipeline on the Right of Way

a. Pipelines laid longitudinally on Conrail's right-of-way shall be located as far as practicable from any tracks or other important structures and as close to the railroad property line as possible. Longitudinal pipelines must not be located in earth embankments or within ditches located on the right-of-way.

b. Pipelines shall be located, where practicable, to cross tracks at approximate right angles to the track, but preferably at not less than 45 degrees.

c. Pipelines shall not be placed within a culvert, under railroad bridges, nor closer than 45 feet to any portion of any railroad bridge, building, or other important structure, except in special cases, and then by special design, as approved by the Chief Engineer.

d. Pipelines shall not be located within the limits of a turnout when crossing the track.

e. Where possible, pipelines shall not be located within the limits of an grade crossing when open cut is the method of installation.

f. Pipelines carrying liquified petroleum gas shall, where practicable, cross the railroad where tracks are carried on embankment.

2.3 Depth of Installation

a. Pipelines placed under Conrail track(s) and across Conrail's right-of-way shall be not less than 5-1/2 feet from base of rail to top of pipe at its closest point, except that under sidings or industry tracks this distance may be 4-1/2 feet as approved by the Chief Engineer. On other portions of the right-of-way, where the pipe is not directly beneath any track, the depth from ground surface or from bottom of ditch to top of pipe shall not be less than three (3) feet. Where three (3) feet of cover can not be provided from bottom of ditch, a 6 inch thick concrete slab shall be provided over the pipeline for protection.

b. Pipelines laid longitudinally on Conrail's right-of-way, 50 feet or less from centerline track, shall be buried not less than five (5) feet from ground surface to top of pipe for pipelines carrying oil, gas, petroleum products, or other flammable or highly volatile substances under pressure and all non-flammable substances which by their nature or pressure, in the judgment of the Chief Engineer, may be hazardous to life or property. For pipelines carrying water, sewage and non-flammable substances, the distance from surface of ground to top of pipe may be four (4) feet.

c. Where the pipeline is laid more than 50 feet from centerline of track, the minimum cover shall be at least three (3) feet.

2.4 Pipelines within Limits of a Dedicated Highway

a. Pipelines within the limits of a dedicated highway are subject to all the requirements of this specification and must be designed and installed in accordance with them.

b. The limits of the dedicated highway (right-of-way) must be clearly shown on the plans.

c. Construction can not begin until an agreement has been executed between Conrail and the Owner and proper notification has been given to Conrail's Area Engineer. (See Section 1.7)

2.5 Modification of Existing Facilities

a. Any replacement or modification of an existing carrier pipe and/or casing shall be considered as a new installation, subject to the requirements of this specification.

2.6 Abandoned Facilities

a. The owner of all abandoned pipe crossings and other occupancies shall notify the Chief Engineer, in writing, of the intention to abandon.

b. Abandoned pipelines shall be removed or completely filled with cement grout, compacted sand or other methods as approved by the Chief Engineer.

c. Abandoned manholes and other structures shall be removed for a minimum distance of two (2) feet below existing grade and completely filled with cement grout or compacted sand.

2.7 Conflict of Specifications

a. Where laws or orders of public authority prescribe a higher degree of protection than specified herein, then the higher degree so prescribed shall be deemed a part of this specification.

2.8 Insulation

a. Pipelines and casings shall be suitably insulated from underground conduits carrying electric wires on Conrail property.

2.9 Corrosion Protection and Petroleum Leak Prevention

a. Pipelines on Conrail property that carry petroleum products or hazardous liquids shall be designed in accordance

with current federal, state and/or local regulations that mandate leak detection automatic shutoff, leak monitoring, and sacrificial anodes and/or exterior coatings to minimize corrosion and prevent petroleum releases.

3.0 SOIL INVESTIGATION

3.1 General

a. For all pipe crossings sixty (60) inches in diameter and larger under tracks, and at other locations the Chief Engineer may direct, test borings or other soil investigations, approved by Conrail, shall be made to determine the nature of the underlying material. (See Section 1.4 relative to procedures)

b. For pipe crossings less than sixty (60) inches in diameter under tracks, and at other locations as the Chief Engineer may direct, test borings or other approved investigations may be required when, in the judgment of the Chief Engineer, they are necessary to determine the adequacy of the design and construction of the facilities.

3.2 Location

a. Borings shall be made on each side of the tracks, on the centerline of the pipe crossing, and as close to the tracks as practicable. (See Section 1.4 relative to procedures)

b. Test boring logs shall be accompanied with a plan, drawn to scale, showing the location of the borings in relation to the track(s) and the proposed pipe.

3.3 Sampling

a. Test borings shall be made in accordance with current ASTM Designation D 1586 except that sampling must be continuous from the ground surface to 5 feet below the proposed invert unless rock is encountered before this depth. Where rock is encountered it is to be cored using a Series "M" Double Tube Core Barrel, with a diamond bit, capable of retrieving a rock core at least 1 5/8" in diameter. Individual core runs are not to exceed 5 feet in length.

3.4 Boring Logs

a. Test boring logs shall comply with Plate VIII and clearly indicate all of the following:

- (1) Boring number as shown on the required boring location plan.
- (2) Ground elevation at each boring using same datum as the pipeline construction plans.

- (3) Engineering description of soils or rock encountered.
- (4) Depth and percent recovery of all soil samples.
- (5) Depth from surface for each change in strata.
- (6) Blows for each six inches of penetration for the standard penetration test described in ASTM D 1586. Blows for lesser penetrations should be recorded.
- (7) Percent recovery and Rock Quality Designation (RQD) for all rock cores.
- (8) Depth to ground water while sampling and when it has stabilized in the bore hole.

b. The location of the carrier pipe and/or casing pipe shall be superimposed on the boring logs before submission to the Chief Engineer.

c. All borings shall be sealed, for their full depth, with a 4-3-1 bentonite-cement-sand grout after accurate ground water readings have been taken and recorded.

d. Soil samples taken from auger vanes or return washwater are not acceptable.

3.5 Additional Information

a. When directed by the Chief Engineer, additional borings may be required for the purpose of taking undisturbed thin-wall piston samples or Dennison type samples for laboratory testing to determine the index and engineering properties of certain soil strata.

4.0 DESIGN REQUIREMENTS

4.1 Design Loads

a. All pipes, manholes and other facilities shall be designed for the external and internal loads to which they will be subjected.

b. To allow for placement of additional track(s) or shifting of the existing track(s), all proposed facilities shall be designed as if a railroad loading is directly above the facility.

4.1.1 Earth Loads

a. The dead load of the earth shall be considered as 120 pounds per cubic foot unless soil conditions warrant the use of a higher value.

4.1.2 Railroad Loads

a. The railroad live load used shall be a Cooper E-80 loading with 50% added for impact. The values shown in Table 1 shall be used for the vertical pressure on a buried structure for the various heights of cover.

Table 1

Live loads, including impact, for various heights of cover for a Cooper E-80 loading.

<u>Height of Cover (FT)</u>	<u>Load (LB/SQ FT)</u>
2	3800
5	2400
8	1600
10	1100
12	800
15	600
20	300
30	100

b. To determine the horizontal pressure caused by the railroad loading on a sheet pile wall or other structure adjacent to the track the Boussinesq analysis shall be used. The load on the track shall be taken as a strip load with a width equal to the length of the ties, (8'-6"). The vertical surcharge, q (psf), caused by each axle, shall be uniform and equal to the axle weight divided by the tie length and the axle spacing, (5'-0"). For the E-80 loading this results in;

$$q = 80,000 / (8.5 \times 5) = 1882 \text{ psf.}$$

The horizontal pressure due to live load surcharge at any point on the wall is p_h and can be calculated by the following:

$$p_h = (2q/\pi)(\beta - \sin \beta(\cos 2\alpha)) \quad (\text{See PLATE IX})$$

c. The vertical and horizontal pressures given above shall be used unless an alternate design method is approved by the Chief Engineer. Proposals to use an alternate design method must include acceptable references and a statement explaining the justification for choosing the alternate method.

4.2 Casing Pipe

4.2.1 General Requirements

a. Casing pipe shall be so constructed as to prevent leakage of any substance from the casing throughout its length, except at ends of casing where ends are left open, or through

vent pipes when ends of casing are sealed. Casing shall be installed so as to prevent the formation of a waterway under the railroad, and with an even bearing throughout its length, and shall slope to one end (except for longitudinal occupancy).

b. The casing pipe and joints shall be of metal and of leakproof construction when the pipeline is carrying oil, gas, petroleum products, or other flammable or highly volatile substances under pressure.

c. The inside diameter of the casing pipe shall be such as to allow the carrier pipe to be removed subsequently without disturbing the casing or the roadbed. For steel pipe casings, the inside diameter of the casing pipe shall be at least two (2) inches greater than the largest outside diameter of the carrier pipe joints or couplings, for carrier pipe less than six (6) inches in diameter; and at least four (4) inches greater for carrier pipe six (6) inches and over in diameter.

d. For flexible casing pipe, a minimum vertical deflection of the casing pipe of 3 percent of its diameter, plus 1/2 inch, shall be provided so that no loads from the roadbed, track, traffic or casing pipe itself are transmitted to the carrier pipe. When insulators are used on the carrier pipe, the inside diameter of the flexible casing pipe shall be at least two (2) inches greater than the outside diameter of the carrier pipe for pipe less than eight (8) inches in diameter; at least 3-1/4 inches greater for pipe 8 inches to 16 inches, inclusive, in diameter; and at least 4-1/2 inches greater for pipe 18 inches and over in diameter.

e. In no event shall the casing pipe diameter be larger than is necessary to permit the insertion of the carrier pipe.

f. Casing pipe under railroad tracks and across Conrail's right-of-way shall extend the Greater of the following distances, measured at right angle to centerline of track:

- (1) Across the entire width of the Conrail right-of-way.
- (2) Three (3) feet beyond ditch line.
- (3) Two (2) feet beyond toe of slope.
- (4) A minimum distance of 25 feet from each side of centerline of outside track when casing is sealed at both ends.
- (5) A minimum distance of 45 feet from centerline of outside track when casing is open at both ends.
- (6) Beyond the theoretical railroad embankment line. This line begins at a point, on existing grade, 10'-0" horizontally from centerline track and extends downward on a 1 1/2 (H) to 1 (V) slope. (See Plate III).

g. If additional tracks are constructed in the future, the casing shall be extended correspondingly at the Owner's expense.

4.2.2 Steel Pipe

a. Steel pipe may be installed by open cut, boring or jacking.

b. Steel pipe shall have a minimum yield strength of 35,000 psi. The ASTM or API specification and grade for the pipe is to be shown on the Pipe Data Sheet (Plate I).

c. Joints between the sections of pipe shall be fully welded around the complete circumference of the pipe.

d. Steel pipes with a minimum cover of 5'-6" shall have a minimum wall thickness as shown in Table 2, unless computations indicate that a thicker wall is required.

Table 2

Nominal Diameter (Inches)	Coated or Cathodically Protected	Uncoated and Unprotected
	Nominal Thickness (Inches)	
10 and under	0.188	0.188
12 & 14	0.188	0.250
16	0.219	0.281
18	0.250	0.312
20 & 22	0.281	0.344
24	0.312	0.375
26	0.344	0.406
28	0.375	0.438
30	0.406	0.469
32	0.438	0.500
34 & 36	0.469	0.532
38	0.500	0.562
40	0.531	0.594
42	0.562	0.625
44 & 46	0.594	0.657
48	0.625	0.688
50	0.656	0.719
52	0.688	0.750
54	0.719	0.781
56 & 58	0.750	0.812
60	0.781	0.844
62	0.812	0.875
64	0.844	0.906
66 & 68	0.875	0.938
70	0.906	0.969
72	0.938	1.000

e. Coated steel pipe that is bored or jacked into place shall conform to the wall thickness requirements for uncoated steel pipe since the coating may be damaged during installation.

f. Smooth wall steel pipes with a nominal diameter over 72 inches will not be permitted.

4.2.3 Ductile Iron Pipe

a. Ductile iron pipe shall be installed by open cut only.

b. Ductile iron pipe shall conform to the requirements of ANSI A21.51/AWWA C-151, Class 56.

c. The pipe shall have mechanical or push on type joints.

4.2.4 Corrugated Steel and Corrugated Structural Steel Plate Pipe

a. Corrugated steel pipe and corrugated structural steel plate pipe may be used for a casing only when placed by the open cut method. Jacking or boring through the railroad embankment is not permitted.

b. Pipe shall be bituminous coated and shall conform to the current American Railway Engineering Association Specifications Chapter 1, Part 4.

c. Corrugated steel pipe shall have a minimum sheet thickness as shown in Table 3. Corrugated structural steel plate pipe shall have a minimum plate thickness of 0.168 in. (8 gage). If computations indicate that a greater thickness is required, the thicker sheet or plate shall be used.

TABLE 3

Pipe Diameter (inches)	Sheet Thickness (inches) (gage)	
12 to 30	0.079	14
36	0.109	12
42 to 54	0.138	10
60 to 120	0.168	8

4.2.5 Steel Tunnel Liner Plates

a. Liner plates shall be installed by the tunneling method as detailed in Section 5.1.5 of this specification.

b. Tunnel liner plates shall be galvanized and bituminous coated and shall conform to current AREA Specification Chapter 1, Part 4.17. If the tunnel liner plates are used only to maintain a tunnelled opening until the carrier pipe is

installed, and the annular space between the carrier pipe and the tunnel liner is completely filled with cement grout within a reasonably short time after completion of the tunnel, then the tunnel liner plates need not be galvanized or coated.

c. Tunnel liner plates are to be a minimum of 12 gage and shall be fabricated from structural quality, hot-rolled, carbon-steel sheets or plates conforming to ASTM Specification A 569.

d. The following liner plate information must be shown on the Pipe Data Sheet (Plate I):

- (1) Number of flanges (2 or 4)
- (2) Width of plate
- (3) Whether plate is smooth or corrugated

4.2.6 Reinforced Concrete Pipe

a. Reinforced concrete pipe shall be installed by the open cut or jacking method.

b. Reinforced concrete pipe may be used for a casing provided the pressure in the carrier pipe is less than 100 psi.

c. Pipe placed by open cut shall be installed in accordance with AREA Chapter 8, Part 10, Section 10.4 except that backfill and compaction shall be in accordance with Section 5.1.2 of this specification.

d. Pipe jacked into place shall have tongue and groove joints and shall be installed in accordance with Section 5.1.4 of this specification.

e. Reinforced concrete pipe shall conform to the current ASTM Specification C-76, Class V, Wall C.

4.2.7 Concrete Encasement

a. At locations where the installation is by open cut and a casing pipe is required, but can not be installed due to elbows or other obstructions, concrete encasement may be used when approved by the Chief Engineer.

b. The concrete encasement must be a minimum of six (6) inches thick around the pipe. A 6 x 6 - W 2.9 x W 2.9 welded wire fabric shall be placed in the concrete on all sides.

4.3 Carrier Pipe

a. Carrier pipes within a casing shall be designed for railroad live loads as if they were not encased.

b. The pipe shall be laid with sufficient slack so that it is not in tension.

c. Steel pipe shall not be used to convey sewage, storm water or other liquids which could cause corrosion.

d. The following shall be the minimum requirements for all carrier pipes located on Conrail's right-of-way or under tracks which Conrail operates:

- (1) Ductile Iron Pipe - ANSI A21.51/AWWA C-151, Class 56
- (2) Reinforced Concrete Pipe - ASTM C-76, Class V, Wall C
- (3) Vitrified Clay Pipe - ASTM C-700, Extra Strength
- (4) Corrugated Metal Pipe - AREA Chapter 1, Part 4
 - (a) Minimum gage of pipe to be in accordance with Section 4.2.4 (Table 3) of this specification.
- (5) Steel Pipe -
 - (a) Steel pipe must have a minimum yield strength of 35,000 psi. The ASTM or API specification and grade for the pipe is to be shown on the Pipe Data Sheet.
 - (b) Minimum wall thickness to be in accordance with Section 4.2.2 (Table 2) of this specification.
- (6) Others - As approved by the Chief Engineer.

4.3.1 Pipelines Carrying Flammable Substances

a. Pipelines carrying oil, liquefied petroleum gas, natural or manufactured gas and other flammable products shall be of metal and conform to the requirements of the current ANSI B 31.4, with Addenda, Liquefied Petroleum Transportation Piping Systems, ANSI B 31.8, "Gas Transmission and Distribution Piping Systems" and other applicable ANSI Codes, except that the maximum allowable stresses for design of steel pipe shall not exceed the following percentages of the specified minimum yield strength (multiplied by the longitudinal joint factor) of the pipe as defined in the ANSI Codes:

- (1) The following percentages apply to hoop stress in steel pipe within a casing under railroad tracks, across railroad right-of-way and longitudinally on railroad right-of-way:
 - (a) Seventy-two percent on oil pipelines.

(b) Fifty percent for pipelines carrying condensate, natural gasoline, natural gas liquids, liquefied petroleum gas, and other petroleum products.

(c) Sixty percent for installations on gas pipelines.

(2) The following percentages apply to hoop stress in steel pipe laid longitudinally on railroad right-of-way without a casing:

(a) Sixty percent for oil pipelines.

(b) Forty percent for pipelines carrying condensate, natural gasoline, natural gas liquids, liquefied petroleum gas, and other petroleum products.

(c) Forty percent for gas pipelines.

4.4 End Seals

a. Casings for carriers of flammable and hazardous substances shall be suitably sealed to the outside of the carrier pipe. Details of the seals shall be shown on the plans.

b. Casings for carriers of non-flammable substances shall have both ends of the casing blocked up in such a way as to prevent the entrance of foreign material, but allowing leakage to pass in the event of a carrier break.

c. Where ends of casings are at or above ground surface and above high water level, they may be left open, provided drainage is afforded in such a manner that leakage will be conducted away from railroad tracks and structures.

4.5 Vents

a. Sealed casings for flammable substances shall be properly vented. Vent pipes shall be of sufficient diameter, but in no case less than two (2) inches in diameter, and shall be attached near each end of the casing and project through the ground surface at right-of-way lines or not less than 45 feet (measured at right angles) from centerline of nearest track.

b. Vent pipes shall extend not less than four (4) feet above the ground surface. Top of vent pipe shall have a down-turned elbow, properly screened, or a relief valve. Vents in locations subject to high water shall be extended above the maximum elevation of high water and shall be supported and protected in a manner approved by the Chief Engineer.

c. Vent pipes shall be at least four (4) feet (vertically) from aerial electric wires or greater if required by National Electrical Safety Code (ANSI C2).

d. When the pipeline is in a public highway, street-type vents shall be installed.

4.6 Signs

a. All pipelines (except those in streets where it would not be practical to do so) shall be prominently marked at right-of-way lines (on both sides of track for crossings) by durable, weatherproof signs located over the centerline of the pipe. Signs shall show the following:

- (1) Name and address of owner
- (2) Contents of pipe
- (3) Pressure in pipe
- (4) Pipe depth below grade at point of a sign
- (5) Emergency telephone number in event of pipe rupture

b. For pipelines running longitudinally on Conrail property, signs shall be placed over the pipe (or offset and appropriately marked) at all changes in direction of the pipeline. Such signs should also be located so that when standing at one sign the next adjacent marker in either direction is visible. In no event shall they be placed more than 500 feet apart unless otherwise specified by the Chief Engineer.

c. The Owner must maintain all signs on Conrail's right-of-way as long as the occupational agreement is in effect.

4.7 Shut-off Valves

a. Accessible emergency shut-off valves shall be installed within effective distances each side of the railroad at locations selected by the Chief Engineer where hazard to life and property must be guarded against. No additional valves will be required where pipelines are provided with automatic control stations and within distances approved by the Chief Engineer,

4.8 Cathodic Protection

a. Cathodic protection shall be applied to all pipelines carrying flammable substances on Conrail's right-of-way.

b. For crossings and at other locations where the pipeline must be placed within a casing, the casing is to have cathodic protection or the wall thickness is to be increased to the requirements of Section 4.2.2 Table 2.

c. Where casing and/or carrier pipe is cathodically protected by other than anodes, the Chief Engineer shall be notified and a suitable test made to ensure that other railroad structures and facilities are adequately protected from the cathodic current in accordance with the recommendation of

current Reports of Correlating Committee on Cathodic Protection, published by the National Association of Corrosion Engineers.

d. Where sacrificial anodes are used the locations shall be marked with durable signs.

4.9 Manholes

a. Manholes shall not be located on Conrail property where possible. At locations where this is not practical, including longitudinal occupancies, manholes shall be precast concrete sections conforming to ASTM Designation C 478, "Specification for Precast Concrete Manhole Sections".

b. The top of manholes located on Conrail property shall be flush with top of ground.

c. The distance from centerline of adjacent track to centerline of proposed manhole shall be shown on the plans.

4.10 Box Culverts

a. Reinforced concrete box culverts shall conform to the requirements of AREA Chapter 8, Part 16.

4.11 Drainage

a. Occupancies shall be designed, and their construction shall be accomplished, so that adequate and uninterrupted drainage of Conrail's right-of-way is maintained.

b. All pipes, ditches and other structures carrying surface drainage on Conrail property and/or under Conrail tracks shall be designed to carry the run-off from a one hundred (100) year storm. Computations indicating this design and suitable topographic plans, prepared by a Professional Engineer, shall be submitted for Conrail's approval.

c. If the drainage is to discharge into an existing drainage channel on Conrail's right-of-way and/or under Conrail tracks, the computations should include the hydraulic analysis of any existing structure.

d. Detention ponds must not be placed on any part of Conrail's right-of-way. Also, the railroad embankment must not be used as any part of a detention pond structure.

e. Submitted with the computations shall be formal approval of the proposed design by the appropriate governmental agency having jurisdiction.

4.12 Pipelines on Bridges

a. Pipelines of any type shall not be installed on any bridge carrying Conrail tracks.

b. New overhead pipe bridges shall not be constructed over Conrail's right-of-way where underground installation of the pipeline is possible. Where the Applicant can show that no practicable alternative is available, this type of structure will be permitted provided the following conditions are met:

- (1) The vertical clearance, distance from top of rail to bottom of structure, is shown and is a minimum of 23'-0".
- (2) The support bents for the overhead structure are located off of Conrail's right-of-way or a minimum distance of 18'-0" from centerline track, whichever distance is greater.
- (3) Support bents within 25'-0" of centerline track have pier protection in accordance with AREA, Chapter 8, Part 2, Section 2.1.5.
- (4) Complete structural plans and design computations for the structure and foundations, stamped by a Professional Engineer, are submitted with the application.

c. Pipelines carrying flammable substances or non-flammable substances, which by their nature might cause damage if escaping on or near railroad facilities or personnel, shall not be installed on bridges over Conrail tracks. In special cases when it can be demonstrated to the Chief Engineer's satisfaction that such an installation is necessary and that no practicable alternative is available, the Chief Engineer may permit the installation and only by special design approved by him.

d. When permitted, pipelines on bridges over Conrail tracks shall be so located as to minimize the possibility of damage from vehicles, railroad equipment, vandalism and other external causes. They shall be encased in a casing pipe as directed by the Chief Engineer (See Plate VII).

5.0 CONSTRUCTION REQUIREMENTS

5.1 Method of Installation

5.1.1 General Requirements

- a. Bored, jacked or tunneled installations shall have a bore hole essentially the same as the outside diameter of the pipe plus the thickness of the protective coating.
- b. The use of water or other liquids to facilitate casing emplacement and spoil removal is prohibited.
- c. If during installation an obstruction is encountered which prevents installation of the pipe in accordance with this specification, the pipe shall be abandoned in place and immediately filled with grout. A new installation procedure and revised plans must be submitted to, and approved by, the Chief Engineer before work can resume.

5.1.2 Open Cut

- a. The Owner must request open cut approval when making application for occupancy.
- b. Installations beneath the track by open trench methods will be permitted only with the approval of the Division General Manager of the territory involved.
- c. Installations by open cut will not be permitted under mainline track(s), track(s) carrying heavy tonnage or track(s) carrying passenger trains. Also, open cut shall not be used within the limits of a highway/railroad grade crossing or its approaches (25 feet either side of traveled way) where possible.
- d. At locations where open cut is permitted the trench is to be backfilled with crushed stone with a top size of the aggregate to be a maximum of 2 inches and to have no more than 5% passing the number 200 sieve. The gradation of the material is to be such that a dense stable mass is produced.
- e. The backfill material shall be placed in loose 6 inch lifts and compacted to at least 95% of its maximum density with a moisture content that is no more than 1% greater than or 2% less than the optimum moisture as determined in accordance with current ASTM Designation D - 1557 (Modified Proctor). When the backfill material is within 3 feet of the subgrade elevation (the interface of the ballast and the subsoil) a compaction of at least 98% will be required. Compaction test results confirming compliance must be provided to Conrail's Area Engineer by the Owner.
- f. All backfilled pipes laid either perpendicular or parallel to the tracks must be designed so that the backfill

material will be positively drained. This may require the placement of lateral drains on pipes laid longitudinally to the track and the installation of stub perforated pipes at the edge of the slopes.

g. Unless otherwise agreed upon, all work involving rail, ties and other track material will be performed by railroad employees at the sole expense of the Owner.

5.1.3 Boring

a. This method consists of pushing the pipe into the earth with a boring auger rotating within the pipe to remove the spoil:

b. The boring operation shall be progressed on a 24-hour basis without stoppage (except for adding lengths of pipe) until the leading edge of the pipe has reached the receiving pit.

c. The front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger from leading the pipe so that there will be no unsupported excavation ahead of the pipe.

d. The auger and cutting head arrangement shall be removable from within the pipe in the event an obstruction is encountered. If the obstruction cannot be removed without excavation in advance of the pipe, procedures as outlined in Section 5.1.1 c. must be implemented immediately.

e. The over-cut by the cutting head shall not exceed the outside diameter of the pipe by more than one half inch. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe (plus coating) by more than approximately 1 inch, grouting (see Section 5.2) or other methods approved by the Chief Engineer shall be employed to fill such voids.

f. The face of the cutting head shall be arranged to provide a reasonable obstruction to the free flow of soft or poor material.

g. Plans and description of the arrangement to be used shall be submitted to the Chief Engineer for approval and no work shall proceed until such approval is obtained.

h. Any method which employs simultaneous boring and jacking for pipes over 8 inches in diameter which does not have the above approved arrangement will not be permitted. For pipe 8 inches and less in diameter, augering or boring without this arrangement may be considered for use only as approved by the Chief Engineer.

5.1.4 Jacking

a. This method consists of pushing sections of pipe into position with jacks placed against a backstop and excavation performed by hand from within the jacking shield at the head of the pipe. Ordinarily 36 inch pipe is the least size which should be used, since it is not practical to work within smaller diameter pipes.

b. Jacking shall be in accordance with the current American Railway Engineering Association Specifications, Chapter 1, Part 4, "Jacking Culvert Pipe Through Fills." This operation shall be conducted without hand-mining ahead of the pipe and without the use of any type of boring, auguring, or drilling equipment.

c. Bracing and backstops shall be so designed and jacks of sufficient rating used so that the jacking can be progressed on a 24-hour basis without stoppage (except for adding lengths of pipe) until the leading edge of the pipe has reached the receiving pit.

d. When jacking reinforced concrete pipe, a jacking shield shall be fabricated as a special section of reinforced concrete pipe with a steel cutting edge, hood, breasting attachments, etc., cast into the pipe. The wall thickness and reinforcing shall be designed for the jacking stresses.

e. When jacking reinforced concrete pipe, grout holes tapped for no smaller than 1 1/2 inch pipe spaced at approximately 3 feet around the circumference and 4 feet longitudinally shall be cast into the pipe at manufacture.

f. Immediately upon completion of jacking operations, the installation shall be pressure grouted as per Section 5.2 of this specification.

5.1.5 Tunneling

a. This method consists of placing rings of liner plates within the tail section of a tunneling shield or tunneling machine. A tunneling shield shall be used for all liner plate installations unless otherwise approved by the Chief Engineer.

b. The shield shall be of steel construction, designed to support a railroad track loading as specified in Section 4.1 of this specification, in addition to other loadings it must sustain. The advancing face shall be provided with a hood, extending no less than 20 inches beyond the face and extending around no less than the upper 240 degrees of the total circumference. It shall be of sufficient length to permit the installation of at least one complete ring of liner plates within the shield before it is advanced for the installation of the next ring of liner plates. The shield shall conform to and

not exceed the outside dimensions of the liner plate tunnel being placed by more than one inch at any point on the periphery unless otherwise approved by the Chief Engineer.

c. The shield shall be adequately braced and provided with necessary appurtenances for completely bulkheading the face with horizontal breastboards, and arranged so that the excavation can be benched as may be necessary. Excavation shall not be advanced beyond the edge of the hood, except in rock.

d. Manufacturer's shop detail plans and manufacturer's computations showing the ability of the tunnel liner plates to resist the jacking stresses shall be submitted to the Chief Engineer for approval.

e. Unless otherwise approved by the Chief Engineer, the tunneling shall be conducted continuously, on a 24-hour basis, until the tunnel liner extends at least beyond the theoretical railroad embankment line (See Plate III).

f. At any interruption of the tunneling operation, the heading shall be completely bulkheaded.

g. The liner plates shall have tapped grout holes for no smaller than 1-1/2 inch pipe, spaced at approximately 3 feet around the circumference of the tunnel liner and 4 feet longitudinally.

h. Grouting behind the liner plates shall be in accordance with Section 5.2 of this specification.

5.2 Grouting

a. For jacked and tunneled installations a uniform mixture of 1:6 (cement:sand) cement grout shall be placed under pressure through the grout holes to fill any voids which exist between the pipe or liner plate and the undisturbed earth.

b. Grouting shall start at the lowest hole in each grout panel and proceed upwards simultaneously on both sides of the pipe.

c. A threaded plug shall be installed in each grout hole as the grouting is completed at that hole.

d. When grouting tunnel liner plates grouting shall be kept as close to the heading as possible, using grout stops behind the liner plates if necessary. Grouting shall proceed as directed by the Chief Engineer, but in no event shall more than six (6) lineal feet of tunnel be progressed beyond the grouting.

5.3 Soil Stabilization

a. Pressure grouting of the soils or freezing of the soils before jacking, boring, or tunneling may be required at the direction of the Chief Engineer to stabilize the soils, control water, prevent loss of material and prevent settlement or displacement of embankment. Grout shall be cement, chemical or other special injection material selected to accomplish the necessary stabilization.

b. The materials to be used and the method of injection shall be prepared by a Registered Professional Soils Engineer, or by an experienced and qualified company specializing in this work and submitted for approval to the Chief Engineer before the start of work. Proof of experience and competency shall accompany the submission.

5.4 Dewatering

a. When water is known or expected to be encountered, pumps of sufficient capacity to handle the flow shall be maintained at the site and, upon approval of the Chief Engineer to operate them, they shall be in constantly attended operation on a 24-hour basis until, in the sole judgement of the Chief Engineer, their operation can be safely halted. When dewatering, close observation shall be maintained to detect any settlement or displacement of railroad embankment, tracks, and facilities.

5.5 Safety Requirements

a. All operations shall be conducted so as not to interfere with, interrupt, or endanger the operation of trains nor damage, destroy, or endanger the integrity of railroad facilities. All work on or near Conrail property shall be conducted in accordance with Conrail safety rules and regulations. The contractor shall secure and comply with the Conrail safety rules and shall give written acknowledgment to Conrail that they have been received, read, and understood by the contractor and his employees. Operations will be subject to Conrail inspection at any and all times.

b. All cranes, lifts, or other equipment that will be operated in the vicinity of the railroad's electrification and power transmission facilities shall be electrically grounded as directed by the Chief Engineer.

c. At all times when the work is being progressed, a field supervisor for the work with no less than twelve (12) months experience in the operation of the equipment being used shall be present. If boring equipment or similar machines are being used, the machine operator also shall have no less than twelve (12) months experience in the operation of the equipment being used.

d. Whenever equipment or personnel are working closer than fifteen (15) feet from the centerline of an adjacent track, that track shall be considered as being obstructed. Insofar as possible, all operations shall be conducted no less than this distance. Operations closer than fifteen (15) feet from the centerline of a track shall be conducted only with the permission of, and as directed by, a duly qualified railroad employee present at the site of the work.

e. Crossing of tracks at grade by equipment and personnel is prohibited except by prior arrangement with, and as directed by, the Chief Engineer.

5.6 Blasting

a. Blasting will not be permitted under or on Conrail's right-of-way.

5.7 Temporary Track Supports

a. When the jacking, boring or tunneling method of installation is used, and depending upon the size and location of the crossing, temporary track supports shall be installed at the direction of the Chief Engineer.

b. Details of the temporary track supports shall conform to Conrail Standard Plan No. 43380-R1 (Rev. 4-10-90)

c. The Owner's contractor shall supply the track supports with installation and removal performed by Conrail employees.

d. The Owner shall reimburse Conrail for all costs associated with the installation and removal of the track supports.

5.8 Protection of Drainage Facilities

a. If, in the course of construction, it may be necessary to block a ditch, pipe or other drainage facility, temporary pipes, ditches or other drainage facilities shall be installed to maintain adequate drainage, as approved by the Chief Engineer. Upon completion of the work, the temporary facilities shall be removed and the permanent facilities restored.

b. Soil erosion methods shall be used to protect railroad ditches and other drainage facilities during construction on and adjacent to Conrail's right-of-way.

5.9 Support of Excavation Adjacent to Track

5.9.1 Launching and Receiving Pits

a. The location and dimensions of all pits or excavations shall be shown on the plans with the dimension from centerline

of adjacent track to face of pits or excavations clearly labeled. Also, the bottom of pit or excavation must be shown on the profile.

b. The face of all pits shall be located a minimum of twenty-five (25) feet from centerline of adjacent track, measured at right angles to track, unless otherwise approved by the Chief Engineer.

c. If the bottom of the pit excavation intersects the theoretical railroad embankment line (See Plate III) interlocking steel sheet piling, driven prior to excavation, must be used to protect the track stability. The use of trench boxes or similar devices are not acceptable in this area.

d. Design plans and computations for the pits, stamped by a Professional Engineer, must be submitted by the Owner at time of application or by the contractor prior to start of construction. If the pit design is to be submitted by the contractor, the project specifications must require the contractor to obtain Conrail's approval prior to beginning any work on or which may affect Conrail property.

e. The sheeting shall be designed to support all lateral forces caused by the earth, railroad and other surcharge loads. See Section 4.1 for railroad loadings.

f. After construction and backfilling all sheet piling within ten (10) feet of centerline track must be cut off eighteen (18) inches below final grade and left in place.

g. All excavated areas are to be illuminated (flashing warning lights not permitted), fenced and otherwise protected as directed by the Chief Engineer or his designated representative.

5.9.2 Parallel Trenching and Other Excavation.

a. When a pipeline or other structure is to be placed adjacent to a Conrail track within the theoretical railroad embankment line (See Plate V), interlocking steel sheet piling must be used.

b. The design and construction requirements for this construction shall be in accordance with the requirements of Section 5.9.1.

5.10 Inspection and Testing

a. For pipelines carrying flammable or hazardous materials, ANSI Codes B 31.8 and B 31.4, current at time of constructing the pipeline, shall govern the inspection and

testing of the facility on Conrail property, except as follows:

- (1) One-hundred percent of all field welds shall be inspected by radiographic examinations, and such field welds shall be inspected for 100 percent of the circumference.
- (2) The proof testing of the strength of carrier pipe shall be in accordance with the requirements of ANSI B 31.8 for Class Locations 2, 3, or 4, or ANSI B 31.4, as applicable.

5.11 Reimbursement of Conrail Costs

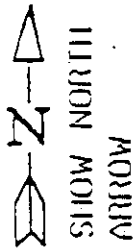
a. All Conrail costs associated with the pipe installation (inspection, flagging, track work, etc.) shall be reimbursed to Conrail by the Owner of the facility. Reimbursement by the contractor is not acceptable.

PIPE DATA SHEET
(For crossings and longitudinal occupancy)

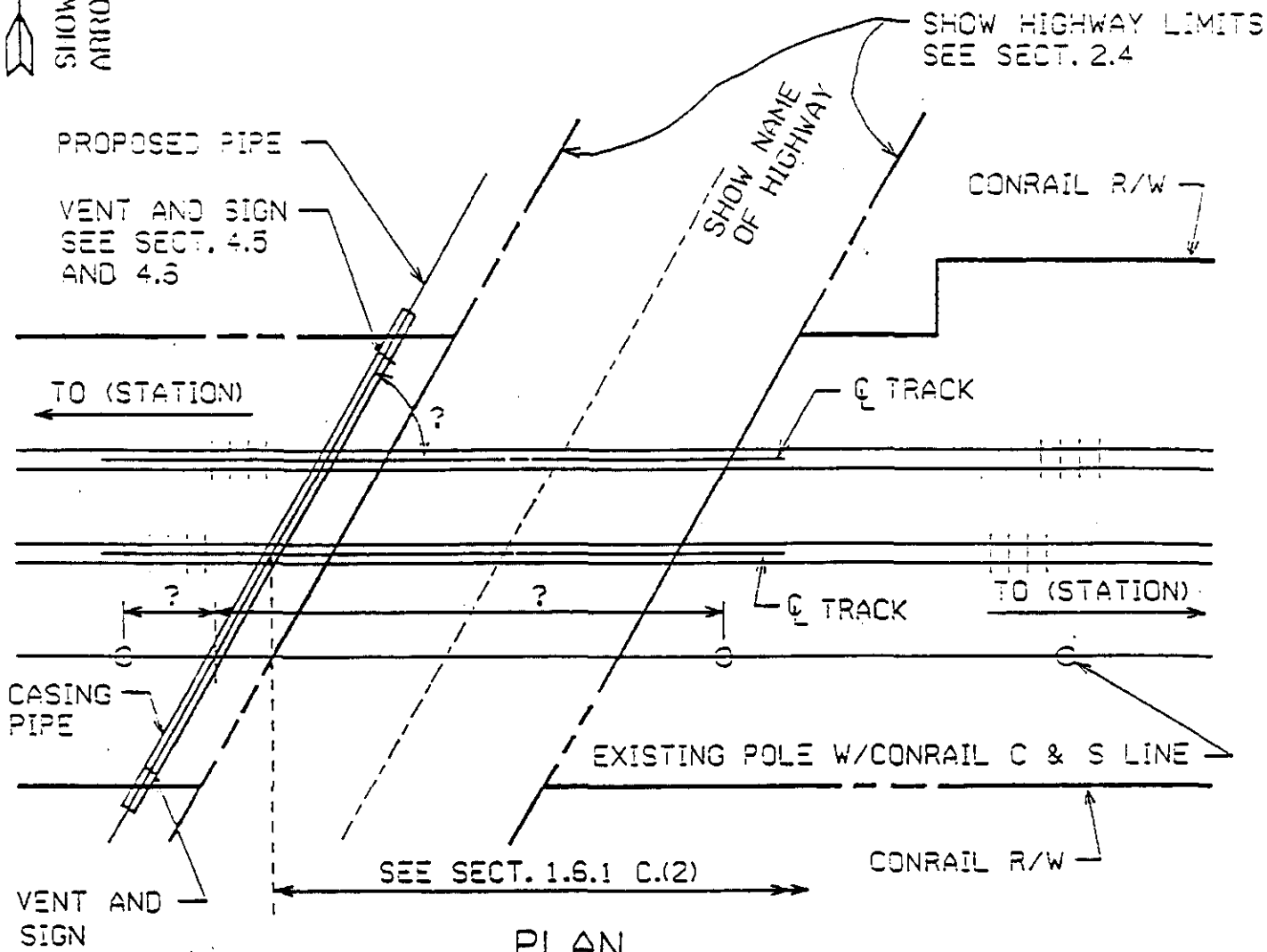
	<u>Pipe Data</u>	
	<u>Carrier Pipe</u>	<u>Casing Pipe</u>
Contents To Be Handled	_____	_____
Normal Operating Pressure.....	_____	_____
Nominal Size Of Pipe.....	_____	_____
O. S. Diameter.....	_____	_____
I. S. Diameter.....	_____	_____
Wall Thickness.....	_____	_____
Weight Per Foot.....	_____	_____
Material.....	_____	_____
Process Of Manufacture.....	_____	_____
Specification.....	_____	_____
Grade Or Class.....	_____	_____
Test Pressure.....	_____	_____
Type Of Joint.....	_____	_____
Type Of Coating.....	_____	_____
Details Of Cathodic Protection..	_____	_____
Details Of Seal Or Protection At Ends Of Casing.....	_____	_____
Method Of Installation.....	_____	_____
Character Of Subsurface Material At The Crossing Location.....	_____	_____
Approximate Ground Water Level..	_____	_____
Source Of Information On Subsurface Conditions (Borings, Test Pits Or Other.....	_____	_____

NOTE: Any soil investigation made on railroad property or adjacent to tracks shall be carried on under the supervision of Conrail's Chief Engineer. (See Section 1.4)

PLATE II



INFORMATION TO BE SHOWN ON PLAN VIEW OF DRAWINGS
WHEN FACILITY IS A CROSSING



PLAN

SCALE OF DRAWING TO BE SHOWN

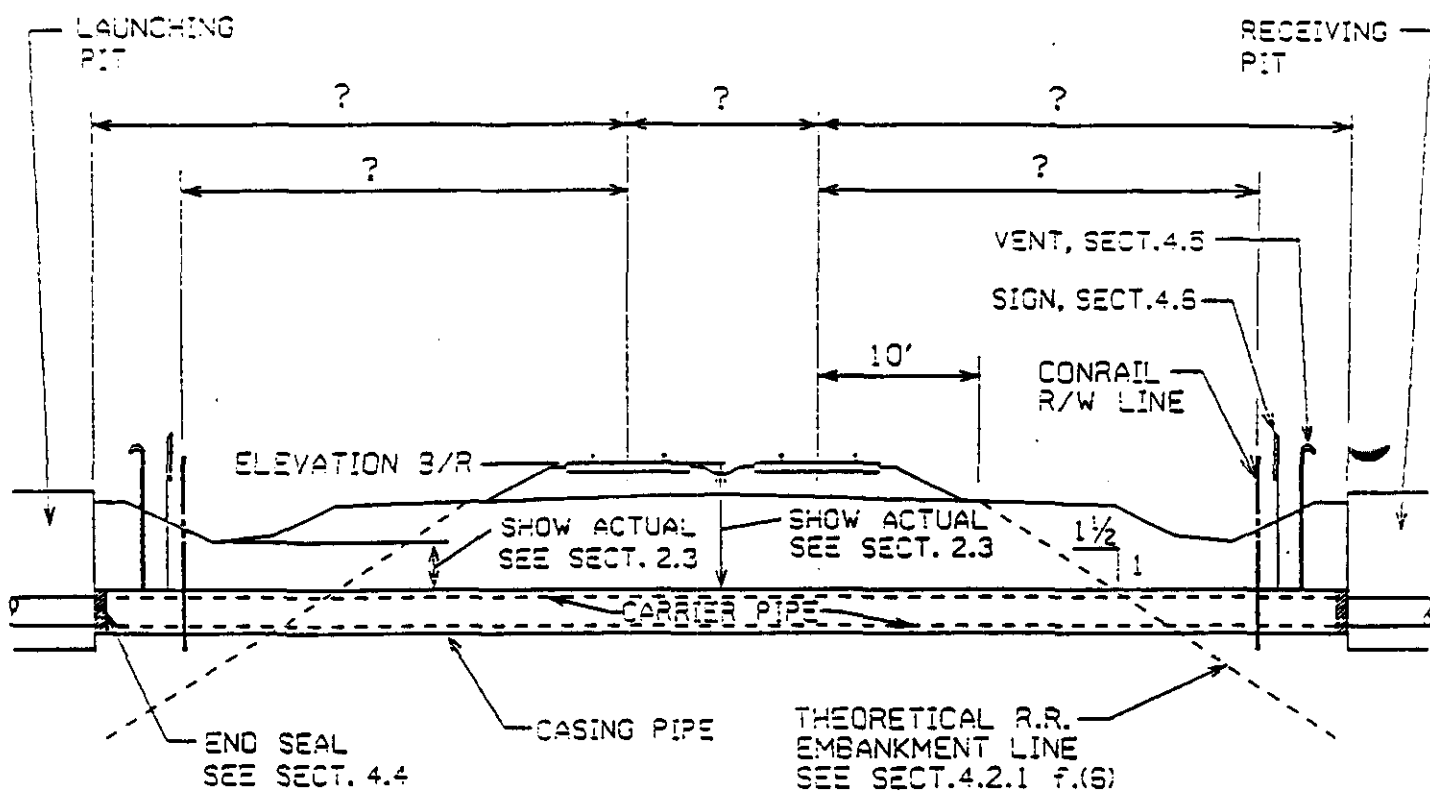
NOTES:

IF THE PROPOSED LINE IS WITHIN HIGHWAY LIMITS, THE SAME INFORMATION IS REQUIRED AS SHOWN ON THIS PLATE.

IF THE PROPOSED PIPE IS TO SERVE A NEW DEVELOPMENT, A MAP SHOWING THE AREA IN RELATION TO ESTABLISHED AREAS AND ROADS IS TO BE SENT WITH THE REQUEST.

PLATE III

PIPELINE CROSSING

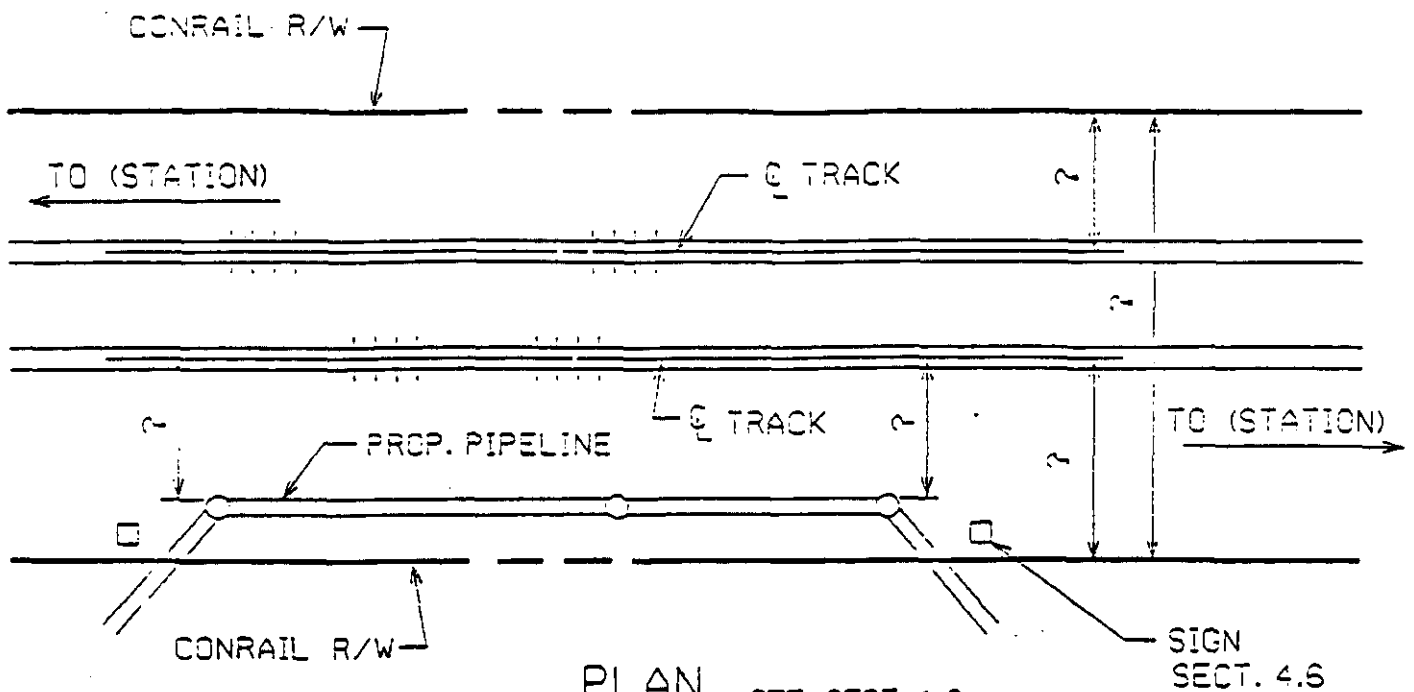


PROFILE

SCALE OF DRAWING TO BE SHOWN

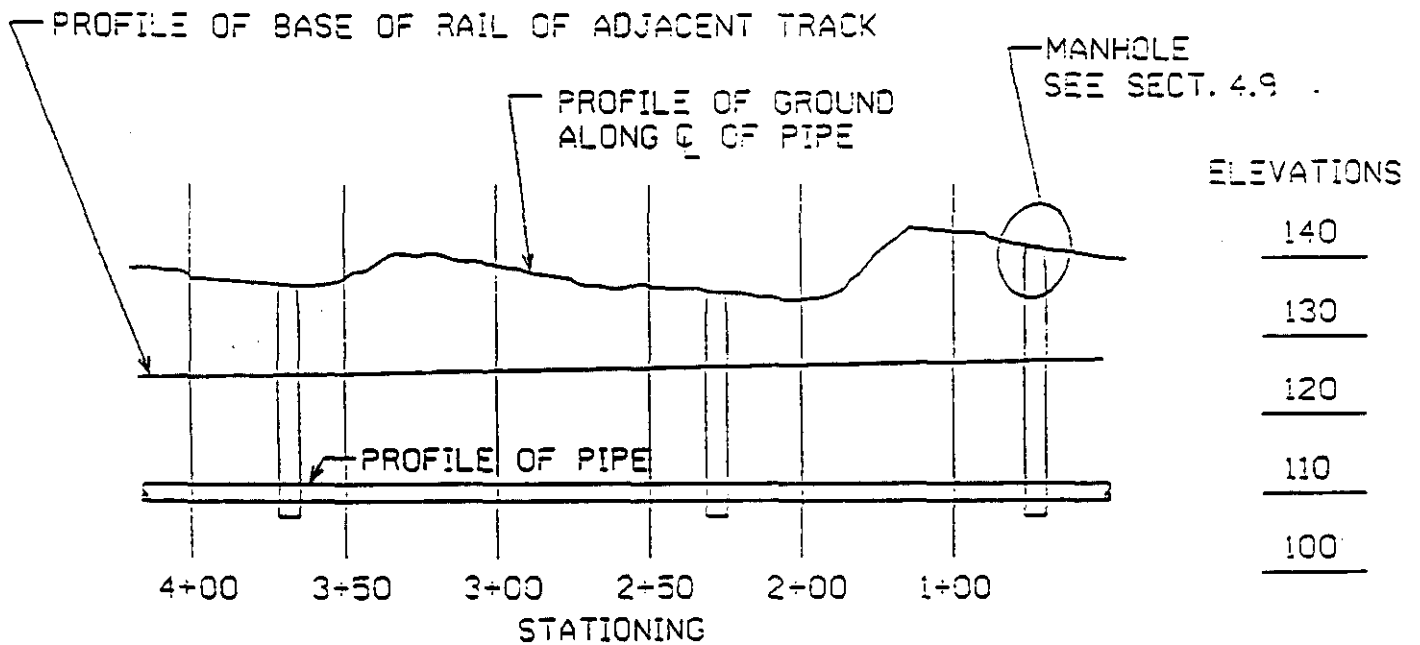
PLATE IV

LONGITUDINAL OCCUPANCY



PLAN -SEE SECT. 1.6

SCALE OF DRAWING TO BE SHOWN



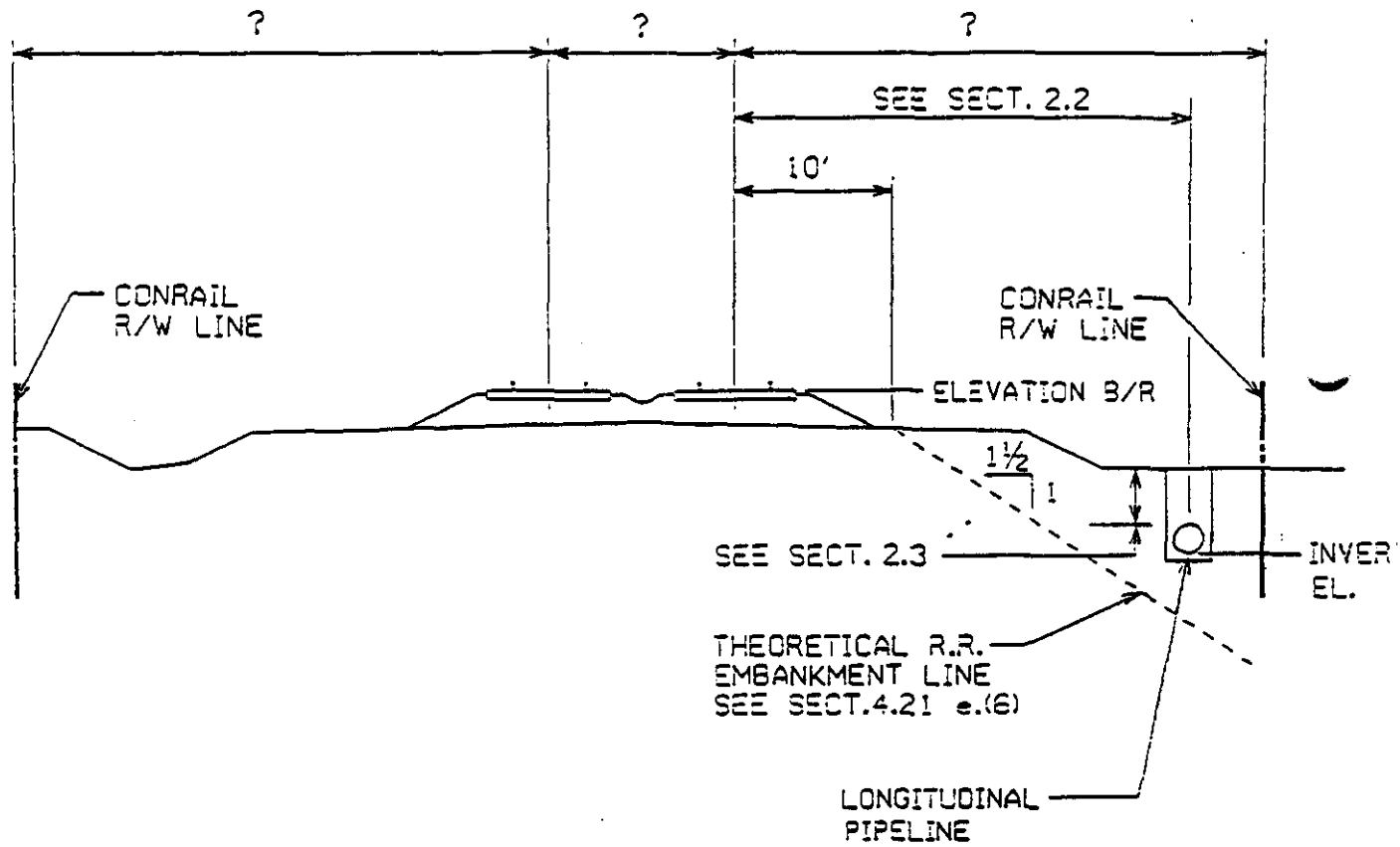
PROFILE -SEE SECT. 1.6

SCALE: HORIZ.: _____

VERT.: _____

PLATE V

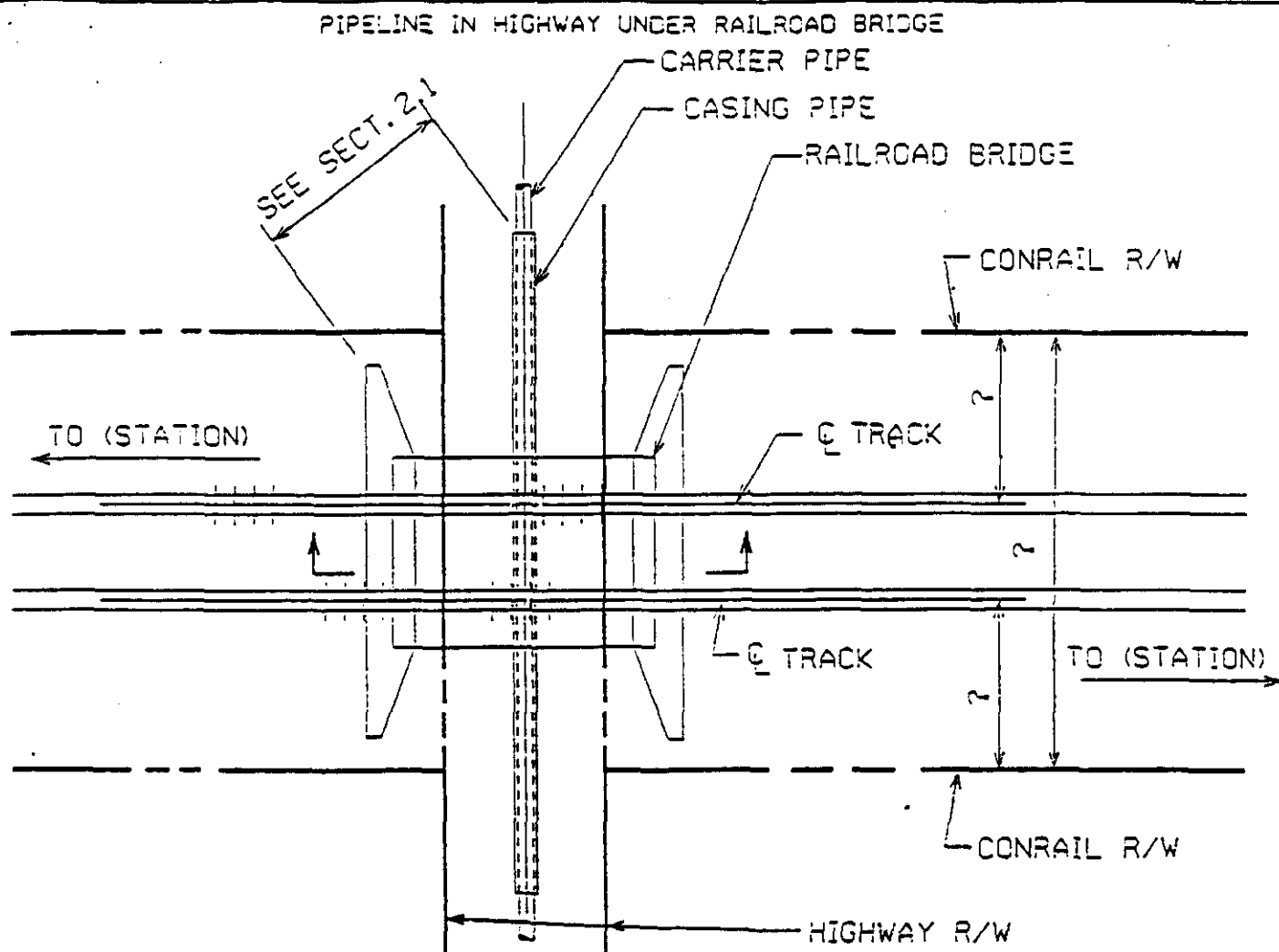
LONGITUDINAL OCCUPANCY



SECTION

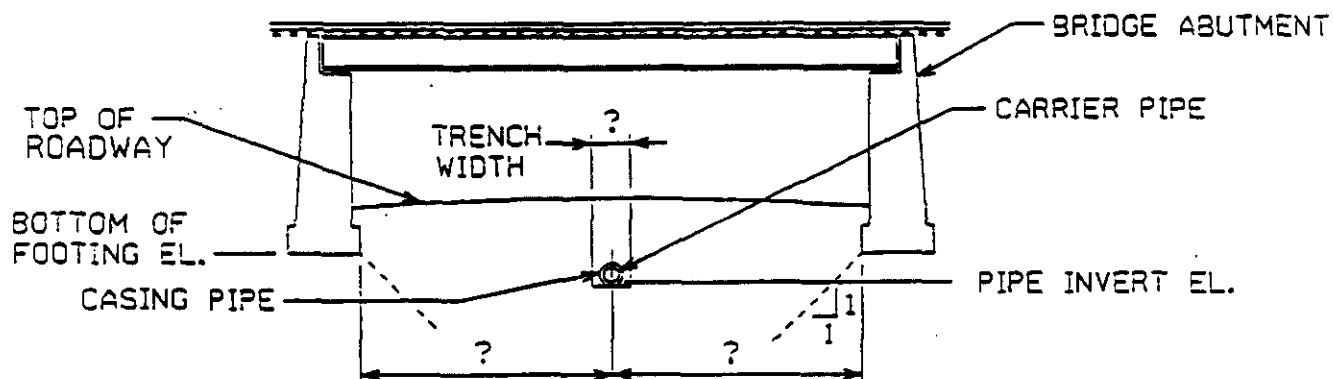
SCALE OF DRAWING TO BE SHOWN

NOTE: SECTIONS TO BE TAKEN EVERY 500 FEET (MAX.).



PLAN

SCALE OF DRAWING TO BE SHOWN



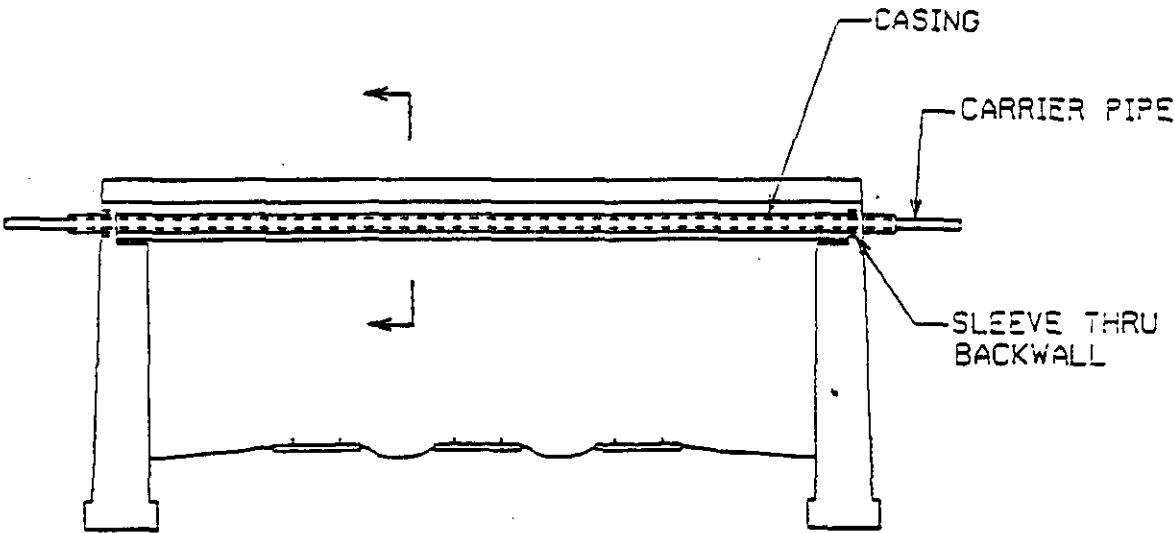
SECTION

SCALE OF DRAWING TO BE SHOWN

NOTE: PIPE OR EXCAVATION MUST NOT BE WITHIN THE 1 TO 1 SLOPE LINE THAT EXTENDS FROM BOTTOM OF FOOTING.

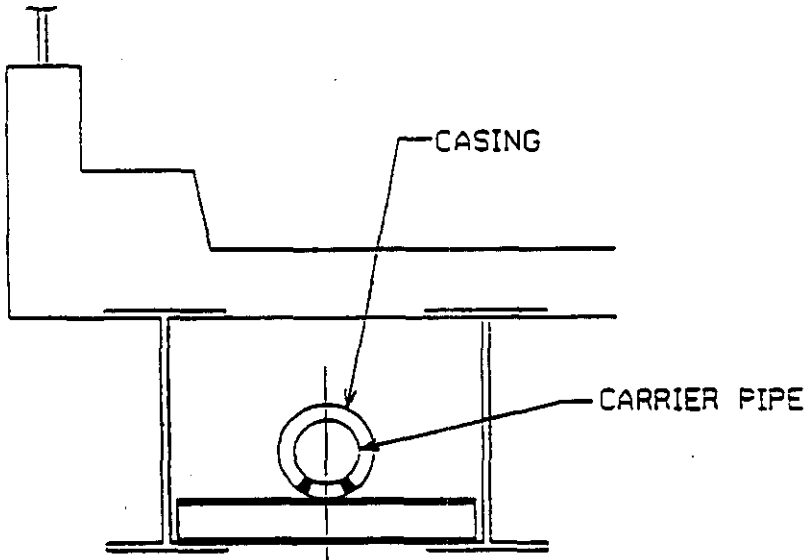
PLATE VII

PIPELINE ON HIGHWAY BRIDGE OVER RAILROAD



ELEVATION

SCALE OF DRAWING TO BE SHOWN



SECTION

SCALE OF DRAWING TO BE SHOWN

TEST BORING LOG

PLATE VIII

PROJECT

LOCATION

DATE STARTED

DATE COMPLETED

HOLE NO.

SURF. EL

JOB NO.

GROUND WATER DEPTH
WHILE DRILLING

BEFORE CASING
REMOVED

AFTER CASING
REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING
30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING
%OR — % CORE RECOVERY

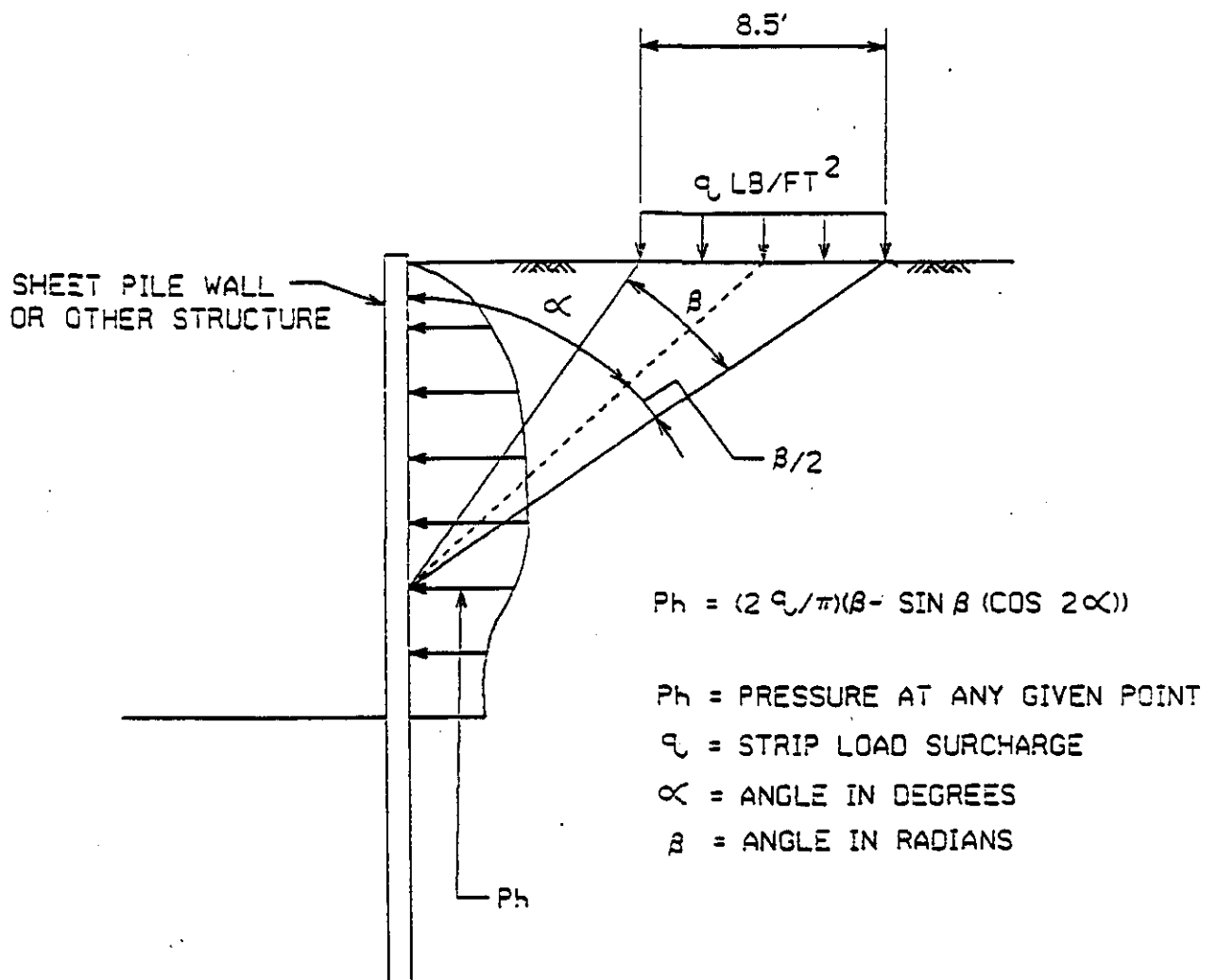
CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
5.0	0.0'-	1		6/14		Brown moist medium dense fine to coarse SAND and fine to medium GRAVEL, little silt	
	2.0'			14/19	28		
	2.0'-	2		9/15			
	4.0'			15/23	30		
	4.0'-	3		17/18			
10.0	6.0'			11/21	29	Brown moist stiff SILT	6.0'
	6.0'-	4		9/6			8.5'
	8.0'			5/7	11		
	8.0'-	5		10/12		Brown moist very stiff SILT, little fine to coarse sand, little fine gravel	12.5'
	10.0'			11/11	23		
15.0	10.0'-	6		12/11			
	11.3'			50-.3'			15.0'
						Gray dry hard silty weathered SHALE	15.0'
						Top of Rock	
20.0	15.0'-	R-1Rec	BX Core			Gray weathered steeply bedded SHALE	
	20.0'		46"	77%			
						Bottom of Boring	20.0'

PLATE IX

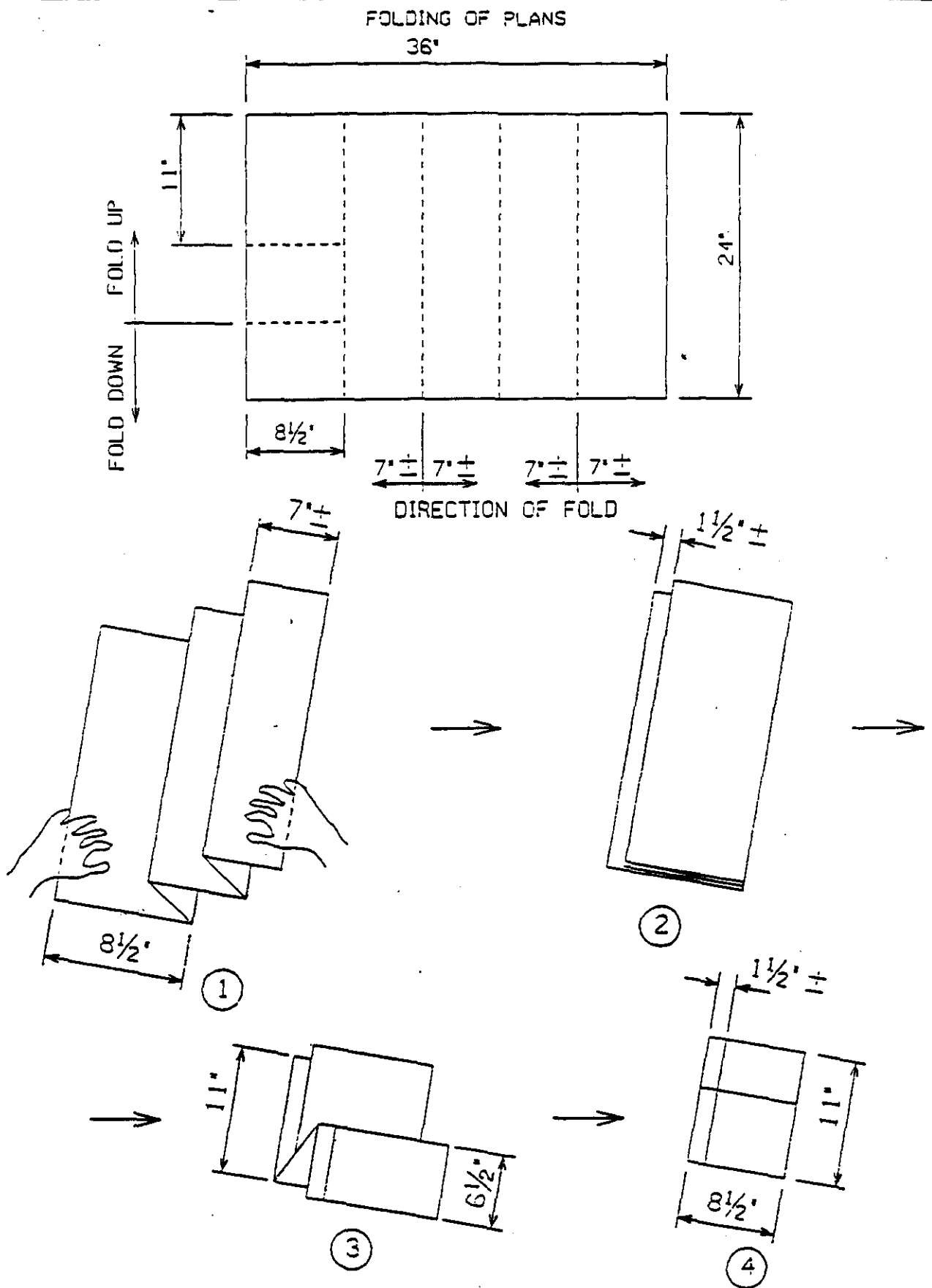
LATERAL PRESSURE DIAGRAM



ELEVATION

LATERAL PRESSURE DUE TO STRIP LOAD

PLATE X



PUBLICATION STANDARDS SOURCES

ANSI American National Standards Institute, Inc.
 1430 Broadway
 New York, NY 10018

AREA American Railway Engineering Association
 50 F Street, N.W.
 Washington, DC 20001

ASTM American Society for Testing and Materials
 1916 Race Street
 Philadelphia, PA 19103

AWWA American Water Works Association, Inc.
 6666 West Quincy Avenue
 Denver, CO 80235

 The National Association of Corrosion Engineers
 Houston, TX 77026

NOTE: If other than AREA, ASTM or AWWA specifications are referred to for design, materials or workmanship on the plans and specifications for the work, then copies of the applicable sections of such other specifications referred to shall accompany the plans and specifications for the work.

PART 6

PROJECT SPECIFICATIONS

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PART 6

PROJECT SPECIFICATION

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PART 6

PROJECT SPECIFICATIONS

GENERAL

WORK INCLUDED

The work under each item shall include all labor, materials, tools, equipment, supplies, cost of insurance and bonds, other miscellaneous costs, together with all of the work specifically described under each item and other work necessary to complete the project in accordance with the obvious or expressed intent of the contract documents.

OBLIGATIONS

The Contractor is obligated under this contract to construct the improvements as contemplated and proposed in the contract documents. The Contractor is further obligated to make any and all changes in the work as ordered by the Engineer and approved by the Owner. All work shall be done for the unit or lump sum prices bid and shall be subject to additional payments or credits as authorized under the terms of Section 16 of the General Conditions.

PAYMENT

The unit and lump sum prices as bid to be paid for the respective items shall be payment in full for the completion of all work specified under each item, complete and ready for use, including testing, as shown on the plans and as specified. Payment shall be made under each item for all such work which is not specifically included under any other item.

INDIANA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS

The "Standard Specifications" adopted 1993, by the INDIANA DEPARTMENT OF TRANSPORTATION, are hereby incorporated into these Contract Documents. Copies of these standards are available for inspection at the offices of the Engineer.

ITEM 1

DUCTILE IRON WATER MAIN

For the unit price bid per linear foot for the water main of the respective sizes as described in the project specification, the CONTRACTOR shall furnish all pipe of the required sizes, fittings, joint materials, installation of pipe and fitting, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structures, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified.

The location of the water main may be shifted during the course of construction by the Engineer to avoid interference with existing utilities whose exact location are not known. No additional compensation will be allowed for the shifting of the water main to avoid such interference. In general, the Contractor shall locate all existing utilities prior to the start of the construction.

Pipe Materials:

The pipe shall meet the requirements of the latest revision of AWWA Specification C151. Sizes 12 inch nominal diameter and smaller shall be Class 52. Sizes 16 inch and larger shall be Class 51.

Each pipe shall have the weight and class designation conspicuously painted on it. In addition, each pipe shall have cast on it the manufacturer's mark and the year in which the pipe was cast. The size of the letters and figures shall be as large as practicable.

Pipe shall be as manufactured by Clow, United States Pipe and Foundry, American Cast Iron Pipe Company, Griffin, or approved equal.

All pipe shall be furnished with "push on" type joints utilizing rubber gaskets to obtain a tight seal. Joints shall comply with all applicable provisions of the latest revision of AWWA Specification C-111. Joint lubricant shall be furnished by the pipe manufacturer. Mechanical joint end, AWWA Spec. C-111, may be substituted for push on joint pipe ends. All joint materials shall be furnished by the pipe manufacturer.

All pipe shall be furnished with 1/16" thickness cement mortar linings, which conform in all respects to the latest revision of AWWA Section C-104. Cement mortar lining shall be provided with a seal coat. Pipe shall be bituminous coated on the outside.

Water main shall be installed and tested as per the manufacture's instruction and as per AWWA Standard C-600 "Installation of Ductile-Iron Water Mains and Their

Appurtenances" (latest edition). Pipe shall be disinfected as per AWWA Standard C-651 "Disinfecting Water Mains" (latest Edition).

Pipe shall be as manufactured by Clow, United States Pipe and Foundry, American Cast Iron Pipe Company, Griffin, or approved equal.

Pipe Installation

All water main shall be laid to the alignment and depth shown on the plans unless directed otherwise by the ENGINEER. All pipes shall be bedded firmly on undisturbed earth with bell holes excavated beneath the bells. Should the CONTRACTOR excavate to a depth below the invert of the pipe without the directions of the ENGINEER, the pipe shall be laid on shaped bedding with compacted granular fill between the pipe and undisturbed earth at the CONTRACTOR'S expense.

Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be lowered carefully into the trench in such a manner as to prevent damage to water main materials, protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench. Where necessary, the trench shall be dewatered prior to installation of the pipe.

Examination of material. All pipe, fittings, valves, hydrants, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the ENGINEER, who may prescribe corrective repairs or reject the material.

Pipe ends. All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign materials before the pipe is laid.

Cleaning & Swabbing. If dirt enters the pipe, it shall be removed and the interior pipe surface swabbed with a 1 percent hypochlorite disinfecting solution. If, in the opinion of the ENGINEER, the dirt remaining in the pipe will not be removed by the flushing operation, then the interior of the pipe shall be cleaned by mechanical means such as a hydraulically propelled foam pig or other suitable device acceptable to the ENGINEER, in conjunction with the application of a 1 percent hypochlorite disinfecting solution to the interior pipe surface. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the ENGINEER.

Pipe Placement. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

Pipe Plugs. At times when pipe-laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the ENGINEER. The plug shall be fitted with a means for venting. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation, should the trench fill with water.

Prior to removal of the plug for extending the line or for any other reason, air and/or water pressure in the line shall be released.

Flooding by Storm or Accident During Construction. If the main is flooded during construction, it shall be cleared of the flood water by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with a chlorinated potable water that, at the end of a 24-hour holding period, will have a free chlorine residual of not less than 25 mg/l. The chlorinated water may then be drained or flushed from the main. After construction is completed, the main shall be disinfected.

The maximum trench width shall be shown on the plans unless altered by the ENGINEER in writing. The additional expense for excavation and pavement replacement made necessary by a wider trench width will be incidental to this item and no additional compensation will be made to the CONTRACTOR.

Backfilling

The Contractor shall not backfill water main above the top of the pipe until the alignment and the pipe joints have been checked, inspected and approved by the ENGINEER.

All main, as soon as laid, shall have the space between the pipe and the bottom and sides of the trench packed full by hand and thoroughly tamped with a shovel or light tamper, as fast as placed in layers not exceeding four (4) inches up to the level of the top of the pipe. The filling shall be carried up evenly on both sides. Care shall be taken that no rock, frozen material, or other hard substances are placed in contact with the pipe.

The main shall be covered by hand to a depth of at least eight (8) inches. The material shall be placed in layers not exceeding four (4) inches in depth, and each layer thoroughly tamped and compacted, with at least one tamping for each man depositing material in the trench.

Material for backfilling the space between the pipe and the bottom and sides of the trench, and for covering to a depth of two (2) feet, shall be clean dry earth, free from stones larger than two (2) inches, frozen material or other hard substances (except for conditions hereinafter defined).

The remainder of the trench shall be backfilled by using the material originally excavated from the ditch (except for conditions hereinafter defined), to a height slightly above the original elevation of the ground. Backfilling shall not be left unfinished for more than 600 feet behind the completed pipe work.

No heavy rock shall be dropped into the trench nor placed within three (3) feet of the pipe. In depositing rock in the trench, care must be taken that the rock does not injure the structure. All spaces between pieces of rock shall be filled with earth to insure there being no voids.

Backfilling from the top of the pipe to final grade shall be made in lifts not exceeding twelve (12) inches in depth, and shall meet the requirements of 90% modified proctor for all areas not within the limits of the road-bed and 95% modified proctor for all areas within the limits of the road-bed.

Compaction testing requirements for the project shall be as follows:

- A. For all areas not within the limits of the road-bed: 90% modified proctor in twelve (12) inches maximum lifts with one (1) test per lift every 500 feet.
- B. For all areas within the limits of the road bed: 95% modified proctor in twelve (12) inch maximum lifts with one (1) test per lift every 200 feet.

The contractor shall secure the services of a qualified testing firm to provide the above. Test results will be furnished to the ENGINEER and shall be certified by a licensed engineer. Costs for testing shall be merged into respective water main items.

Hydrostatic Pressure and Leakage Test:

Pressure Test: All new pipe, or any valved section thereof, shall be subjected to a hydrostatic pressure test. The hydrostatic test pressure shall be 150 pounds per square inch, based on the elevation of the line or section of line under test and corrected to the elevation of the test gauge. The duration of each pressure test shall be at least two (2) hours.

Procedure: After the pipe is laid, the joints completed, the newly laid pipe or any valved section thereof shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the ENGINEER. The pump, pipe connection and all necessary apparatus shall be furnished by the CONTRACTOR. The CONTRACTOR shall furnish all gauges for the test and arrange to have any required taps made.

Expelling Air Before Test: Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blow-offs are not available at high places, the CONTRACTOR shall provide the necessary taps at points of highest elevation before the test is made and insert plugs after the air has been released and before the pressure test.

Any cracked or defective pipes, fittings or valves discovered in consequence of this pressure test shall be removed and replaced by the CONTRACTOR at his expense with sound material and the test shall be repeated until satisfactory to the ENGINEER.

All joints showing leakage during the test shall be remade until tight to the satisfaction of the ENGINEER.

Leakage Test: A leakage test shall be conducted after the pressure test has been satisfactorily completed. The CONTRACTOR shall furnish the pump, pipe, connections and all other necessary apparatus including the gauge and measuring device and shall furnish all necessary assistance to conduct the test. The duration of each leakage test shall be two (2) hours and during the test the main shall be subjected to a pressure of 150 psi.

Leakage is defined as the quantity of water supplied into the newly laid pipe or any valved section thereof, necessary to maintain 150 psi test pressure after the pipe has been filled with water and the air expelled. No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{N * D * \sqrt{P}}{3700}$$

in which L equals the allowable leakage, in gallons per hour, N is the number of joints in the length of pipe line tested, D is the nominal diameter of the pipe, in inches and P is the average test pressure during the leakage test, in pounds per square inch gauge. (The allowable leakage according to this formula is equivalent to twenty-three and three-tenths (23.3) U.S. gallons per twenty-four (24) hours per mile of pipe per inch of nominal pipe diameter for pipe in eighteen (18) foot lengths, evaluated at an average pressure of 150 psi).

Should any test of pipe laid disclose leakage greater than that specified, the CONTRACTOR shall, at his sole expense, locate and repair all defective joints until the leakage is within the specified allowance.

The following tables give allowable leakage in gallons per hour per 100 joints and per 1000 feet of main for various size mains.

**LEAKAGE TEST
ALLOWABLE LEAKAGE PER 100 JOINTS IN GALLONS PER HOUR**

Pipe Size	AVG. TEST PRESSURE 150 PSI Leakage per 100 Joints	AVG. TEST PRESSURE 140 PSI Leakage per 100 Joints
6	1.99	1.92
8	2.65	2.56
10	3.31	3.20
12	3.97	3.84
16	5.30	5.12
20	6.62	6.40
24	7.94	7.68
30	9.93	9.60
36	11.91	11.51

ALLOWABLE LEAKAGE PER 1000' OF MAIN IN GALLONS PER HOUR

Pipe Size	150# Pressure	140# Pressure	130# Pressure	100# Pressure
6	1.10	1.07	1.03	.90
8	1.47	1.42	1.37	1.20
10	1.84	1.78	1.71	1.50
12	2.20	2.13	2.06	1.80
16	2.94	2.84	2.74	2.40
20	3.68	3.55	3.42	3.00
24	4.41	4.26	4.11	3.60
30	5.52	5.33	5.14	4.50

Disinfection

General: Disinfection of new water mains and fixtures will be the obligation of the CONTRACTOR in charge of the installation. The CONTRACTOR will sterilize the water main according to the City of Elkhart's recommendation, which are as follows:

Flushing: After completing the new main installation, it shall be flushed with water of sufficient velocity (minimum 10 ft. per sec.) to remove all dirt and other foreign material and a pressure and leakage test run. To determine approximate flow for flushing, assume an average flow from a 2 1/2" nozzle of a hydrant will be approximately 1,000 gallons per minute - from a 4 1/2" nozzle approximately 2,500 gallons per minute. Normally a hydrant will be located 20 feet or less from the end of the main. If no hydrant is within 20 feet of the end of the main a 2" or larger tap shall be installed in the plug at the end of the main.

Disinfecting: When this process has been completed, a properly adjusted calcium hypochlorite solution will be injected into the main with the use of a hypochlorinator. The chlorine will be fed at a constant rate into the new main to obtain a residual concentration of not less than 50 mg/l. (50 PPM). The chlorine residual should be checked at intervals to insure that the proper level is maintained. Chlorine application should continue until the entire main is filled with water having a minimum 50 mg/l (50 PPM) residual. The water should remain in the main for a minimum of 24 hours, during which time all valves, hydrants, etc. along the main must be operated to insure their proper disinfection. After flushing the new mains out to reduce the chlorine residual below 1 mg/l (1 PPM), a bacteriological test as prescribed by the City of Elkhart shall be taken, (3 satisfactory tests on samples taken 24 hours apart). If the results fail to meet this minimum standard, the disinfecting procedure must be repeated and the results again tested before placing the main in service.

Disinfection, Alternate Method: CONTRACTOR may elect to insert the proper amount of calcium hypochlorite in each length of pipe as it is laid. If pipe is carefully handled and kept clean during laying this method will normally give satisfactory results. Several cautions must be observed. First, when filling the pipe initially the water must be introduced slowly to keep the calcium hypochlorite from being flushed to the end of the main. Second, the chlorinated solution must be left in the main a minimum of 72 hours. During this 72 hours all valves, hydrants, etc. along the main must be operated to insure their proper disinfection and to remove all air from the line. The pressure and leakage test may be run at any time after the air has been expelled from the line. At the end of the 72 hour (or longer) period the main must be flushed as described in paragraph 2 until the chlorine residual has been reduced below 1 PPM. Then bacteriological tests as outlined in paragraph 3 shall be taken. If tests do not prove satisfactory it will then be necessary to again disinfect the main using the procedure set forth in paragraph 3.

ITEM 2

DUCTILE IRON FORCE MAIN

For the unit price bid per linear foot for the force main of the respective sizes as described in the project specification, the CONTRACTOR shall furnish all pipe of the required sizes, fittings, joint materials, manholes with air release valves, installation of pipe and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structures, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified.

The location of the force main may be shifted during the course of construction by the ENGINEER to avoid interference with existing utilities whose exact location are not known. No additional compensation will be allowed for the shifting of the force main to avoid such interference. In general, the CONTRACTOR shall locate all existing utilities prior to the start of the construction.

Pipe Materials:

The pipe shall meet the requirements of the latest revision of AWWA Specification C151 Class 52.

Each pipe shall have the weight and class designation conspicuously painted on it. In addition, each pipe shall have cast on it the manufacturer's mark and the year in which the pipe was cast. The size of the letters and figures shall be as large as practicable. Pipe shall be as manufactured by Clow, United States Pipe and Foundry, American Cast Iron Pipe Company, Griffin, or approved equal.

All pipe shall be furnished with "push on" type joints utilizing rubber gaskets to obtain a tight seal. Joints shall comply with all applicable provisions of the latest revision of AWWA Specification C-111. Joint lubricant shall be furnished by pipe manufacturer. Mechanical joint end, AWWA Spec. C-111, may be substituted for push on joint pipe ends. All joint materials shall be furnished by the pipe manufacturer.

All pipe shall be furnished with 1/16" thickness cement mortar linings, which conform in all respects to the latest revision of AWWA Spec. C-104. Cement mortar lining shall be provided with a seal coat. Pipe shall be bituminous coated on the outside.

The pipe shall be backfilled with a detectable marking tape placed 12" from finished grade. The tape shall be 6" wide, polyethylene plastic tape, acid and alkali resistant, minimum thickness 0.005" in with no less than 50 gauge (0.0005") solid aluminum core. The marking tape shall meet all other specifications equal to "magnetic" as manufactured

by Thor Enterprises Inc.. The tape shall be tan or brown in color and clearly printed with the words "Caution-Force Main Buried Below-Not For Water Supply" or similar language.

Manholes with Air Release Valves:

Manholes with air release valves shall be 4 foot in diameter and shall be constructed of precast concrete in accordance with the ASTM Specifications for "Precast Reinforced Concrete Manhole Risers and Tips", designation C-478. The minimum wall thickness shall be 5 inches. Unless otherwise specified or shown on the plans, manhole tops shall be of the eccentric cone type. Precast flat covers and flat bottoms shall be a minimum of 8 inches thick reinforced with two layers of steel with a minimum area of 0.39 square inches per linear foot in both directions in each layer. Each section joint shall contain a rubber O-ring gasket or mastik type sealer as approved by the ENGINEER. Each section shall contain standard manhole steps constructed of ductile iron. Drawings of the manholes must be submitted to the ENGINEER for the approval prior to construction. The two inch air release valve shall be Clow Style S402 Model B Air and Vacuum Valve or approved equal.

Pipe Installation:

All force main shall be laid to the alignment and depth shown on the plans unless directed otherwise by the ENGINEER. All pipes shall be bedded firmly on undisturbed earth with bell holes excavated beneath the bells. Should the CONTRACTOR excavate to a depth below the invert of the pipe without the directions of the ENGINEER, the pipe shall be laid on shaped bedding with compacted granular fill between the pipe and undisturbed earth at the CONTRACTOR'S expense.

Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, and valves, shall be lowered carefully into the trench in such a manner as to prevent damage to force main materials, protective coatings and linings. Under no circumstances shall force main materials be dropped or dumped into the trench. Where necessary, the trench shall be dewatered prior to installation of the pipe.

Examination of Material. All pipe, fittings, valves, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the ENGINEER, who may prescribe corrective repairs or reject the materials.

Pipe Ends. All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign materials before the pipe is laid.

Pipe Cleanliness. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing, or other materials shall be placed in the pipe at any time.

Pipe Placement. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

Pipe Plugs. At times when pipe-laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the ENGINEER. The plug shall be fitted with a means for venting. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation, should the trench fill with water.

Prior to removal of the plug for extending the line or for any other reason, air and/or water pressure in the line shall be released.

The maximum trench width shall be shown on the plans unless altered by the ENGINEER in writing. The additional expense for excavation and pavement replacement made necessary by a wider trench width will be incidental to this item and no additional compensation will be made to the CONTRACTOR.

Backfilling

The Contractor shall not backfill force main above the top of the pipe until the alignment and the pipe joints have been checked, inspected and approved by the ENGINEER.

All main, as soon as laid, shall have the space between the pipe and the bottom and sides of the trench packed full by hand and thoroughly tamped with a shovel or light tamper, as fast as placed in layers not exceeding four (4) inches up to the level of the top of the pipe. The filling shall be carried up evenly on both sides. Care shall be taken that no rock, frozen material, or other hard substances are placed in contact with the pipe.

The main shall be covered by hand to a depth of at least eight (8) inches. The material shall be placed in layers not exceeding four (4) inches in depth, and each layer thoroughly tamped and compacted, with at least one tamping for each man depositing material in the trench.

Material for backfilling the space between the pipe and the bottom and sides of the trench, and for covering to a depth of two (2) feet, shall be clean dry earth, free from stones larger than two (2) inches, frozen material or other hard substances (except for conditions hereinafter defined).

The remainder of the trench shall be backfilled by using the material originally excavated from the ditch (except for conditions hereinafter defined), to a height slightly above the original elevation of the ground. Backfilling shall not be left unfinished for more than 600 feet behind the completed pipe work.

No heavy rock shall be dropped into the trench nor placed within three (3) feet of the pipe. In depositing rock in the trench, care must be taken that the rock does not injure the structure. All spaces between pieces of rock shall be filled with earth to insure there being no voids.

Backfilling from the top of the pipe to final grade shall be made in lifts not exceeding twelve (12) inches in depth, and shall meet a 90% modified proctor for all areas not within the limits of the road-bed and a 95% modified proctor for all areas within the limits of the road-bed.

Compaction testing requirements for the project shall be as follows:

- A. For all areas not within the limits of the road-bed: 90% modified proctor in twelve (12) inches maximum lifts with one (1) test per lift every 500 feet.
- B. For all areas within the limits of the road bed: 95% modified proctor in twelve (12) inch maximum lifts with one (1) test per lift every 200 feet

The contractor shall secure the services of a qualified testing firm to provide the above test results will be furnished to the ENGINEER and shall be certified by a licensed engineer. Costs for testing shall be merged into respective force main items.

Hydrostatic Pressure and Leakage Test:

Pressure Test: All new pipe, or any valved section thereof, shall be subjected to a hydrostatic pressure test. The hydrostatic test pressure shall be 150 pounds per square inch, based on the elevation of the line or section of line under test and corrected to the elevation of the test gauge. The duration of each pressure test shall be at least two (2) hours.

Procedure: After the pipe is laid, the joints completed, the newly laid pipe or any valved section thereof shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the ENGINEER. The pump, pipe connection and all necessary apparatus shall be furnished by the CONTRACTOR. The CONTRACTOR shall furnish all gauges for the test and arrange to have any required taps made.

Expelling Air Before Test: Before applying the specified test pressure, all air shall be expelled from the pipe.

Any cracked or defective pipes, fittings or valves discovered in consequence of this pressure test shall be removed and replaced by the CONTRACTOR at his expense with sound material and the test shall be repeated until satisfactory to the ENGINEER.

All joints showing leakage during the test shall be remade until tight and to the satisfaction of the ENGINEER.

Leakage Test: A leakage test shall be conducted after the pressure test has been satisfactorily completed. The CONTRACTOR shall furnish the pump, pipe, connections and all other necessary apparatus including the gauge and measuring device and shall furnish all necessary assistance to conduct the test. The duration of each leakage test shall be two (2) hours and during the test the main shall be subjected to a pressure of 150 psi.

Leakage is defined as the quantity of water supplied into the newly laid pipe or any valved section thereof, necessary to maintain 150 psi test pressure after the pipe has been filled with water and the air expelled. No pipe installation will be accepted until the leakage meets with allowances to be determined in the final design phase and per the manufactures minimum tolerance.

ITEM 3

DUCTILE IRON FITTINGS

For the unit price bid per linear foot for the ductile iron fitting of the respective sizes as shown and described in the project plans, the CONTRACTOR shall furnish all fittings, joint material, installation of pipe and fitting, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structures, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified.

The fittings to be furnished under this item shall comply with all applicable provisions of the latest revision of AWWA Specification C-110. Fittings shall be Class 350.

Each fitting shall have distinctly cast upon it the following information: manufacturer's mark, nominal diameters of all openings and the fraction of the circle on all bends. The letters and figures shall be cast on the outside and shall be as large as practicable.

Fittings shall be as manufactured by Clow, United States Pipe, American Cast Iron Pipe, Griffin, Tyler Pipe or approved equal.

All fittings shall be furnished with mechanical joint type ends, AWWA Spec. C-111. At joints where restraint is required "set screw" retaining glands (Clow fig. 1058 or equal) will be used and standard M.J. gland will be omitted. Restraint for additional lengths of pipe beyond fittings, shall be calculated using the D.I.P.R.A. method of thrust calculations. Where additional restraint is necessary, mechanical joint pipe with retainer glands shall be used in place of slip joint pipe. Thrust blocking may be used in lieu of additional joint restraints.

Weights of fittings are estimated using Clow specifications.

Lining and Coating of Fittings: The fittings under this item shall be furnished with 1/16" thickness cement mortar linings, which conform in all respects to the latest revision of AWWA Spec. C-104. The cement mortar lining shall be provided with a seal coat. Pipe and fittings shall be bituminous coated on the outside.

Mechanical Joint Restraining Glands:

Glands shall conform to applicable portions of AWWA Spec. C-110, latest revision, and shall be manufactured from ductile iron. Each gland shall have sufficient square head, with cup point, double heat treated parkerized steel set screws that, when the screws are installed with 75 foot pounds of torque, the cup points will bite into the surface of the pipe and prevent blow off or movement of the joint at line pressures up to 200 psi. Gland shall be Clow F-1058 or approved equal.

Additional lengths of pipe to be restrained beyond fittings, plugs, etc. shall be calculated using the D.I.P.R.A. method of thrust calculations. Where additional restraint is necessary, mechanical joint pipe with retainer glands shall be used in place of slip joint pipe.

In lieu of the above thrust blocking will be required.

The cost of restraining glands shall be incidental to and included in Ductile Iron Fittings.

ITEM 4

GATE VALVES & BOXES

This item shall include, but may not be limited to gate valves of various sizes, valve box, connecting pipe, joint materials, installation of pipe and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structures, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified.

All gate valves furnished under this item shall conform to AWWA Spec. C-509, Standard for Resilient Seated Gate Valves, except as otherwise specified herein. Valves shall be Clow, Mueller or approved equal.

End connections shall conform to AWWA Spec. C-111 for mechanical joints. All valves shall be epoxy coated ductile iron resilient wedge with mechanical joint ends, 200 psi working pressure, non-rising stem, O-ring seals, open left (counter clockwise) operating nut and 2" square wrench nut.

All valve stems shall be high strength manganese bronze having a minimum tensile strength of 80,000 psi, a minimum yield strength of 32,000 psi and minimum elongation of 15% in two inches.

Stem seals may be of the O-ring type.

All valves shall be tested at a minimum of twice the working pressure of 200 psi.

The valve box shall be two piece, screw type, with 5¼" shaft. Top section, with cover, which shall be marked "Water", lower section with an enlarged base shall make up the valve box. Box to be adjustable from 45" to 66". Box shall be Tyler Pipe Industries or approved equal.

Valve Box Extension shall permit extending the above valve box by 20" or at a minimum to finished grade at all valve locations. The valve box extension shall be Tyler Pipe Industries or approved equal.

ITEM 4.5

BUTTERFLY VALVES

This item shall include but may not be limited to butterfly valves, valve box, connecting pipe, joint materials, installation of pipe and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structures, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified.

All butterfly valves furnished under this item shall be rubber seated, M.J. end connections complete with gaskets, followers and bolts and shall conform to AWWA Spec. C-504 unless otherwise specified herein. Valves shall be as manufactured by Clow, Dresser, Kennedy or approved equal.

Diameter of the clear waterway opening through each valve shall not be less than the nominal size of the valve (in inches) less one inch. Clear waterway opening to be stated on drawing.

Laying length dimensions need not conform to AWWA. Shafting material and size need not conform to AWWA provided higher strength corrosion resistant shaft material resulting in a greater safety factor than provided by AWWA specifications is used. End connections shall conform to AWWA c-111. Shaft materials and size to be stated on drawing.

Valves shall be installed underground in horizontal lines. Shafts shall be installed horizontally. Gear box shall be securely mounted to the valve and shall be fully submersible enclosed type having a standard AWWA valve operating nut. Gear boxes to be Philadelphia Gear Corporation or equal. Gear boxes are to be factory filled with the correct grade and amount of lubricant.

ITEM 5.1

FIRE HYDRANTS-ELKHART COUNTY

This item shall include, but may not be limited to a 6" hydrant, 6" gate valve, box, 6" D.I. connecting pipe fittings, joint materials, installation of pipe and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structures, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified.

All hydrants shall comply with all provisions of the latest revision of AWWA Standard C-502 and shall have the following characteristics and be Mueller Model "Centurion" or equal.

Size of Hydrant Valve	5 1/4"
Inlet Connection	6"
Type of Inlet Joint	M.J.
Barrel Inside Diameter	8 1/2"
Barrel Metal Thickness	9/16"
Bury Depth (from ground line to bottom of inlet connection)	5'-6"
Outlet Nozzles	2-2 1/2"
	1-4 1/2"
Paint Color	Yellow
Opening Directions	Clockwise
Operating Nut	1 1/4" Pentagon

Nozzle threads to conform to ASA Specification B-26 for "National Standard Fire-Hose Coupling Screw Threads."

All working parts of the hydrant shall be removable from the top of the hydrant without digging and without the use of a lifting device or special tools. Hydrant top casting is to be removable without shutting off the auxiliary water inlet valve.

Fire hydrants shall be of the compression type closing with the line pressure. The valve opening shall be 5 1/4 inches in diameter. The main valve assembly shall be designed so that the bronze seat ring threads into a bronze bushing in the shoe allowing the seat ring to be removed from above ground without excavation.

The bonnet section shall be designed so all bearing surfaces and stem threads are sealed in a lubricant reservoir and automatically lubricated each time the hydrant is operated. Hydrant shall be shipped complete with lubricant.

The hydrant shoe shall have a 6 inch M.J. inlet and at least two drain outlets.

The depth of bury shall be 5 feet 6 inches unless otherwise shown on the drawings.

Hydrants are to be furnished with a breakable feature that will break cleanly upon impact. This shall consist of a two part breakable safety flange and stem coupling or breakaway lugs and breakaway stem coupling. It shall be designed to permit 360 degree rotation of the upper barrel without removal of the ground line flange bolts. Those depending on breakable bolts only at the ground line flange as a safety device will not be acceptable.

ITEM 5.2

FIRE HYDRANTS-ST. JOSEPH COUNTY

This item shall include, but may not be limited to a 6" hydrant, 6" gate valve, box, 6" D.I. connecting pipe fittings, joint materials, installation of pipe and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structures, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified.

All hydrants shall comply with all provisions of the latest revision of AWWA Standard C-502 and shall have the following characteristics and be Clow F2500 or approved equal by Mishawaka Utilities Water Department.

Size of Hydrant Valve	4 1/2"
Inlet Connection	6"
Type of Inlet Joint	M.J.
Barrel Inside Diameter	8 1/2"
Barrel Metal Thickness	9/16"
Bury Depth (from ground line to bottom of inlet connection)	4'-6"
Outlet Nozzles	2-2 1/2" 1-4 1/2"
Paint Color	Yellow
Opening Directions	Counter-clockwise
Operating Nut	1 1/2" Pentagon

Nozzle threads to conform to ASA Specification B-26 for "National Standard Fire-Hose Coupling Screw Threads."

All working parts of the hydrant shall be removable from the top of the hydrant without digging and without the use of a lifting device or special tools. Hydrant top casting is to be removable without shutting off the auxiliary water inlet valve.

Fire hydrants shall be a compression type main and the valve shall close with pressure and provide positive water tight seal. The valve opening shall be 4 1/4 inches in diameter. The main valve assembly shall be designed so that the bronze seat ring threads into a bronze bushing in the shoe allowing the seat ring to be removed from above ground without excavation.

The bonnet section shall be designed so all bearing surfaces and stem threads are sealed in a lubricant reservoir and automatically lubricated each time the hydrant is operated. Hydrant shall be shipped complete with lubricant.

The hydrant shoe shall have a 6 inch M.J. inlet and at least two drain outlets.

The depth of bury shall be 4 feet 6 inches unless otherwise shown on the drawings.

Hydrants are to be furnished with a breakable feature that will break cleanly upon impact. This shall consist of a two part breakable safety flange and stem coupling or breakaway lugs and breakaway stem coupling. It shall be designed to permit 360 degree rotation of the upper barrel without removal of the ground line flange bolts. Those depending on breakable bolts only at the ground line flange as a safety device will not be acceptable.

ITEM 6

BITUMINOUS ROAD AND STREET RESTORATION

TYPE A & TYPE B

For the unit price bid per square yard for the various Bituminous Road Restoration items as defined herein, the CONTRACTOR shall furnish all labor, materials, equipment, and do all work necessary to complete the restoration and replacement of the permanent street or public road pavements as shown on the plans and as specified.

Work Included Under Other Contract Items:

The CONTRACTOR shall note the following work is considered incidental to the work of other contract items.

- Pavement Cutting and Removal
- Excavation and Backfill of Force Main and Water Main
- Trenches with Granular Material
- 6" & 8" Compacted Aggregate Base in Road Areas
- Removal and Replacement of Sidewalk, Parkways, Curb and Gutter, and other Miscellaneous Items

The 6 inch and 8 inch aggregate base material is the temporary pavement replacement required immediately after backfilling the water main or force main trench under the applicable items. This aggregate base material shall be compacted to greater than 95 percent modified proctor density, with its upper surface level with the abutting pavement surfaces. When the permanent pavement replacement begins under this item, the top layer of the aggregate base must be removed to make room for the permanent pavement. Gravel base is incidental to the various pipe items.

Work Included:

The work under this item includes all materials, work, and operations necessary to construct complete the permanent replacement on only those designated public streets, public road pavements, as herein specified. This work shall include the removal of the top layer of the compacted aggregate base, surface milling as directed by the ENGINEER, the replacement of the specified pavement, cleanup, and other necessary work.

Indiana Department of Transportation Specifications:

All materials and construction methods used in the restoration and replacement of street pavements shall be in accordance with the applicable provisions of the most recent

edition of the "Standard Specifications" adopted by the Indiana Department of Transportation, which is made a part of this contract, and sections of which are referred to below.

Aggregate:

The aggregate to be used in the Hot Asphalt Concrete Pavement shall be in accordance with the requirements of Section 403, Hot Asphalt Concrete Pavement and in accordance with Section 904.02, Course Aggregates of the Standard Specifications. The aggregate used shall meet the gradation requirements for No. 5 for HAC Base, No. 9 for HAC Binder, and No. 11 for HAC Surface.

Bituminous Materials:

The bituminous materials shall be in accordance with the requirements as specified under Bituminous Materials, Section 403.03. The bituminous materials shall meet the requirements for AC 5 in Section 902.01.

Time For Replacement:

The CONTRACTOR should begin pavement replacement as soon as possible after completion of each line to minimize inconvenience to the public.

The CONTRACTOR shall do whatever is necessary to control dust problems resulting from the excavation until the pavement replacement is complete. This shall include the use of chloride or road oil as required.

The CONTRACTOR shall again note the requirements for cutting or sawing the existing pavement as specified under the various pipe items. The existing pavement shall be cut to neat straight lines parallel to the trench prior to removal.

Type A Road & Street Restoration:

Resurface with an 8" thick compacted granular base (sand and or gravel) 4" (440#/SYD) of Hot Asphalt Cement Base No. 5, 4½" (495#/SYD) of Hot Asphalt Cement Binder No. 9 and 1½" (165#/SYD) of Hot Asphalt Cement Surface No. 11, and as shown on the plans.

Type B Road & Street Restoration:

Resurface with a 6" thick compacted granular base (sand and/or gravel) 3" (330#/SYD) of Hot Asphalt Cement Base No. 5, 3" (330#/SYD) of Hot Asphalt Cement Binder No. 9 and 1½" (165#/SYD) of Hot Asphalt Cement Surface No. 11, and as shown on the plans.

ITEM 7

BITUMINOUS DRIVE RESTORATION

For the unit price bid per square yard for the various Bituminous Drive Restoration items as defined herein, the CONTRACTOR shall furnish all labor, materials, equipment, and do all work necessary to complete the restoration and replacement of the permanent bituminous driveways as shown on the plans and as specified.

Work Included Under Other Contract Items:

The CONTRACTOR shall note the following work is considered incidental to the work of other contract items.

Pavement Cutting and Removal
Excavation and Backfill of Force Main and Water Main
Trenches with Granular Material
6" Compacted Aggregate Base in Drive Areas
Removal and Replacement of Sidewalk, Parkways, Curb and
Gutter, and other Miscellaneous Items

The 6 inch aggregate base material is the temporary pavement replacement required immediately after backfilling the water main or force main trench under the applicable items. This aggregate base material shall be compacted to greater than 95 percent modified proctor density, with its upper surface level with the abutting pavement surfaces. When the permanent driveway replacement begins under this item, the top layer of the aggregate base must be removed to make room for the permanent pavement. Gravel base is incidental to the various pipe items.

Work Included:

The work under this item includes all materials, work, and operations necessary to construct complete the permanent replacement on only those designated bituminous driveways, as herein specified. This work shall include the removal of the top layer of the compacted aggregate base, the replacement of the specified pavement, cleanup, and other necessary work.

Indiana Department of Transportation Specifications:

All materials and construction methods used in the restoration and replacement of driveway pavements shall be in accordance with the applicable provisions of the most recent edition of the "Standard Specifications" adopted by the Indiana Department of

Transportation, which is made a part of this contract, and sections of which are referred to below.

Aggregate:

The aggregate to be used in the Hot Asphalt Concrete Pavement shall be in accordance with the requirements of Section 403, Hot Asphalt Concrete Pavement and in accordance with Section 904.02, Course Aggregates of the Standard Specifications. The aggregate used shall meet the gradation requirements for No. 5 for HAC Base, No. 9 for HAC Binder, and No. 11 for HAC Surface.

Bituminous Materials:

The bituminous materials shall be in accordance with the requirements as specified under Bituminous Materials, Section 403.03. The bituminous materials shall meet the requirements for AC 5 in Section 902.01.

Time For Replacement:

The CONTRACTOR should begin driveway replacement as soon as possible after completion of each line to minimize inconvenience to the property owner.

The CONTRACTOR shall do whatever is necessary to control dust problems resulting from the excavation until the pavement replacement is complete. This shall include the use of chloride or road oil as required.

The CONTRACTOR shall again note the requirements for cutting or sawing the existing pavement as specified under the various pipe items. The existing pavement shall be cut to neat straight lines parallel to the trench prior to removal.

Bituminous Drives:

Resurface with a 6" thick compacted granular base (sand and/or gravel), 5" (550#/SYD) of Hot Asphalt Cement, Surface No. 11 and as shown on the plans.

ITEM 8

CONCRETE DRIVE RESTORATION

For the unit price bid per square yard for the various concrete restoration items, the CONTRACTOR shall furnish all materials and do all work necessary to replace and restore complete and in place concrete drives removed or disturbed during the water main and force main construction as herein specified or as directed by the ENGINEER.

Work Included Under Other Contract Items:

The CONTRACTOR shall note that the following work is considered incidental to the water main and force main work of other contract items.

- Pavement Cutting and Removal
- Excavation and Backfill of Force Main and Water Main
- Trenches with Granular Material
- 6" Compacted Aggregate Base in Drive Areas
- Removal and Replacement of Sidewalk, Parkways, Curb and
- Gutter, and other Miscellaneous Items

For the unit price bid, the CONTRACTOR shall provide all required forming, labor, etc. to replace in kind the various concrete drives, which he is directed to remove by the ENGINEER during the course of the water main and force main construction. Drives shall be replaced in accordance with Section 501 of the INDOT Standard Specifications for Plain Concrete Pavement, 6".

ITEM 9

BORE & JACK

For the unit price bid per lineal foot for the bore and jack of the respective sizes as shown on the plans the CONTRACTOR shall furnish all materials and operations necessary to construct the piping complete inside a casing pipe beneath and across the highway. This includes excavation and backfill of jacking pits, sheeting, pipe and jointing, casing pipe, warning signs for traffic, disposal of excess materials, removal and disposal of water, surface restoration, protection of existing structures and utilities, testing and other related work not specifically called for under other contract items.

The casing pipe shall be jacked into place to satisfactory grade and alignment using acceptable construction methods. All work shall be done in a workmanlike manner using sheeting or shoring as required to protect the workman and the existing structures and utilities. All work shall be done to the satisfaction of the Respective Highway Authority, as well as the ENGINEERS. The ends of the casing pipe shall be sealed with brick masonry and filled with pea stone after the carrier pipe is installed to prevent the entry of dirt and debris. After completion of work, the CONTRACTOR shall leave the site in a better or equal condition than prior to start of construction.

Proper warning signals will be provided during construction as required by the respective highway authority. All costs incurred during the construction of the pipe crossing the highway, testing, and meeting the approval of the Respective Highway Authority shall be at the expense of the CONTRACTOR.

The carrier pipes referred to shall consist of those pipes carrying water across the highway crossing. The carrier pipes shall be of the size and material type supplied for the water main. The carrier pipes shall be subject to the same tests as required for water main.

The length of casing pipe shall be as shown on the plans and shall be watertight throughout its length except at the ends. The casing pipe shall be of smooth wall steel with a yield strength of 35,000 PSI and shall be of the diameter and wall thickness as shown on the plans. The casing pipe joints shall be welded as they are installed and the interior and exterior of the pipe shall be coated with a protective asphaltic barrier. The I.D. of the casing pipe has been selected to provide minimum tolerance for the installation of the carrier pipe. The CONTRACTOR may, at his expense, use a larger I.D. casing pipe if he so desires.

The bore and jack will be measured for payment between the ends of the casing pipe. The CONTRACTOR will be paid his unit price for each foot of bore and jack of the respective size actually installed which price shall be payment in full for all work and materials including the carrier pipe within the casing. The carrier pipe will not be

measured separately for payment under any other item. The locations for the bore and jack crossings will be staked in the field by the ENGINEER according to the project plans. Field adjustment of the length or location of bore and jacked crossings and quantities thereto will be made or approved by the ENGINEER.

ITEM 10

WATER WELL ABANDONMENT

For the unit price bid the CONTRACTOR shall furnish all labor, materials, equipment, and do all work necessary to complete the water well abandonments at homes or businesses as listed in the "Water Service Connections" item and as directed by the ENGINEER.

Abandonment will be in accordance with Indiana Administrative Code Title 310, Article 16, Chapter 10. Such work shall be performed by a licensed water well driller licensed in the State of Indiana. All abandonment procedures shall be inspected by local officials qualified to do so or by the ENGINEER. Following is the portion of the code which shall apply:

310 IAC 16-10-2 Permanent Abandonment of Wells:

Sec. 2(A) A well drilled before January 1, 1988 that is abandoned must be sealed at or above the ground surface by a welded, threaded or mechanically attached water tight cap. The well shall be maintained so the well does not become a source or channel of groundwater contamination.

(B) A well drilled and abandoned after December 31, 1987 shall be plugged with an impervious grouting material to prevent the migration of materials or fluids in the well and the loss of pressure in a confined aquifer.

(C) A well drilled after December 31, 1987 and not equipped with casing must be plugged within seventy-two (72) hours after completion.

(D) This subsection applies to a cased or uncased well drilled and abandoned after December 31, 1987.

(1) The plugging material must consist of the following:

- (A) neat cement with not more than five percent (5%) by weight of bentonite additive;
- (B) bentonite slurry (which can include polymers designed to retard swelling);
- (C) pelletized or coarse grade crushed bentonite; or
- (D) other materials approved by the commission.

(2) The following methods apply:

- (A) Cement and bentonite slurries shall be pumped into place in a continuous operation with a grout pipe introducing the plugging material at the bottom of the well and moving the pipe progressively upward as the well is filled.

- (B) Plugging materials other than neat cement or bentonite slurry shall be installed in a manner to prevent bridging of the well or borehole. The well or borehole shall be measured periodically throughout the plugging process to ensure that bridging does not occur.
- (3) The following procedures apply:
 - (A) An abandoned well shall be disconnected from the water system. Any substance which may interfere with plugging shall be removed, if practicable.
 - (B) A well, other than a monitoring well or an uncased borehole, shall be chlorinated before abandonment as provided in 310 IAC 16-9-1.
- (4) Cased wells shall be plugged as follows:
 - (A) A cased well shall be plugged with neat cement, bentonite slurry, coarse grade crushed or pelletized bentonite from the bottom of the well to within two (2) feet below the ground surface, unless otherwise provided by the department.
 - (B) The well casing shall be severed at least two (2) feet below the ground surface and a cement plug larger in diameter than the well bore shall be constructed over the well bore and covered with natural clay material to the ground surface.
- (5) An uncased well, other than a borehole drilled by a bucket rig, shall be filled with natural earth materials, neat cement, bentonite slurry, coarse grade crushed or pelletized bentonite from the bottom of the uncased well to a depth no less than twenty-five (25) feet below ground surface. The borehole shall be filled with neat cement, coarse grade crushed or pelletized bentonite from a depth no less than twenty-five (25) feet below ground surface to within two (2) feet below ground surface with a bentonite slurry or pelletized bentonite from the bottom of the uncased well to a depth no less than twenty-five (25) feet below ground surface. The borehole shall be filled with neat cement, coarse grade crushed or pelletized bentonite from a depth no less than twenty-five (25) feet below ground surface to within two (2) feet below ground surface. The remaining hole shall be filled with natural clay material to ground surface.
- (6) A cased or uncased monitoring well shall be plugged from the bottom of the well or borehole to the ground surface with a bentonite slurry or pelletized or coarse grade crushed bentonite.
- (7) Bucket wells shall be plugged as follows:
 - (A) A bucket well installed as buried slab construction shall be filled with gravel from the bottom of the well to within ten (10) feet below the ground surface. Neat cement, bentonite slurry, pelletized or coarse grade crushed bentonite shall be installed in the casing or well pipe from no less than ten (10) feet below the

ground surface to within two (2) feet below the ground surface. The well pipe shall be severed at least two (2) feet below the ground surface and covered with a cement plug larger in diameter than the well pipe. The remaining hole shall be filled with natural clay material to the ground surface.

- (B) Bucket well construction using casing with an inside diameter of less than twelve (12) inches extending the entire length of the borehole and equipped with a well screen shall be abandoned under subdivision (d) (4) (A).
- (C) An uncased borehole drilled by a bucket rig shall be filled with natural earth material from the bottom of the hole to ground surface. The earth material shall be thoroughly tamped to minimize settling.
- (D) The division shall be notified in writing of a well abandonment within thirty (30) days after plugging is completed.

Where homes are found to have an additional well used for home heating or cooling purposes only, the project engineer shall be notified. The contractor will determine if any cross connections from this additional well to the potable supply lines in the home exist, and advise the project engineer accordingly. If none are found, this additional well will be left open and operational. If cross connections exist, these shall be eliminated according to local applicable plumbing codes and be approved by the local code inspector.

Where homes are found to have existing home heating or cooling systems incorporating the same water well employed for potable water supply, the contractor will identify cross connections and eliminate them according to local applicable plumbing codes and be approved by the project engineer. The well will then be left open and operational.

Costs for plumbing alterations associated with the above shall be merged into respective water service connection (Item 11) pay items

ITEM 11

WATER SERVICE CONNECTIONS

For the unit price bid the CONTRACTOR shall furnish all labor, materials, equipment and do all the work necessary to complete the municipal water service connections to the users indicated on the attached listing.

This may include but may not be limited to service taps, curb stops, house leads, pressure reducing valves, meter assemblies backflow preventers if required, and all necessary interior plumbing alterations required to connect the home or business to the water main including the disconnection, and removal of point of entry and point of use carbon filtration systems where applicable. Removed filter systems will be transported to the Conrail Railyard Compound and stored in a secure storage area to be provided by Conrail.

Service connections shall be in accordance with AWWA Standard C-800 and with the following City of Elkhart standards.

Taps to the water main shall be made so that the corporation cock is to be installed 45° from the vertical axis of the main. The corporation cock shall be Mueller Oricorp H-15008 with Mueller CC threads X 1" copper compression or approved equal

The service line for all users shall be 1 inch type K copper installed with 48 inches minimum cover. The service line shall be laid 90° to the main in a location to be determined by the ENGINEER in the field. Generally, the determined location shall be appropriate for the most direct or shortest route from the service shut off to the home. The route shall be selected to avoid plantings, landscaping, driveways, sidewalks, and other exterior appurtenances wherever possible. The entry point to the home or business will also be field determined and will be as close as possible to the existing connection of the interior plumbing to the existing water well supply line.

The service shut off will consist of a round way ground key stop, Mueller Oriseal 3H-1504-2 or approved equal, and service shut off box (Tyler 95E or approved equal). The CONTRACTOR shall provide one curb box key plus wrench (Pollard P-537 and Pollard P-54102 or approved equal) and Clam (Pollard P-527) for each 10 boxes or less.

Meter assemblies shall be as shown on the following Figures and shall confirm to the City of Elkhart minimum requirements in every way. Meter shall be 5/8" Neptune Model T-10 with remote reader connection. The remote reader connection will be mounted in a conspicuous location outside existing fences accessible to City employees at all times.

Water pressure reducing valves may be required in some installations. Pressure reducing valves will be manufactured by Watt Industries Model No. U5 or U5B for sizes 1/2" to 2"

and be suitable for initial pressures up to 300 p.s.i. with a reduced pressure range of 25-75 p.s.i. and be set for 50 p.s.i. at the factory. Installation of pressure reducing valves will be as directed by the ENGINEER. Cost will be incidental to water service connections.

Interior plumbing alterations will be limited to only those required to permanently install the meter yoke and meter, make the permanent connection to the existing cold water supply line and to abandon, and remove of the point of entry or point of use carbon filtration system (where applicable).

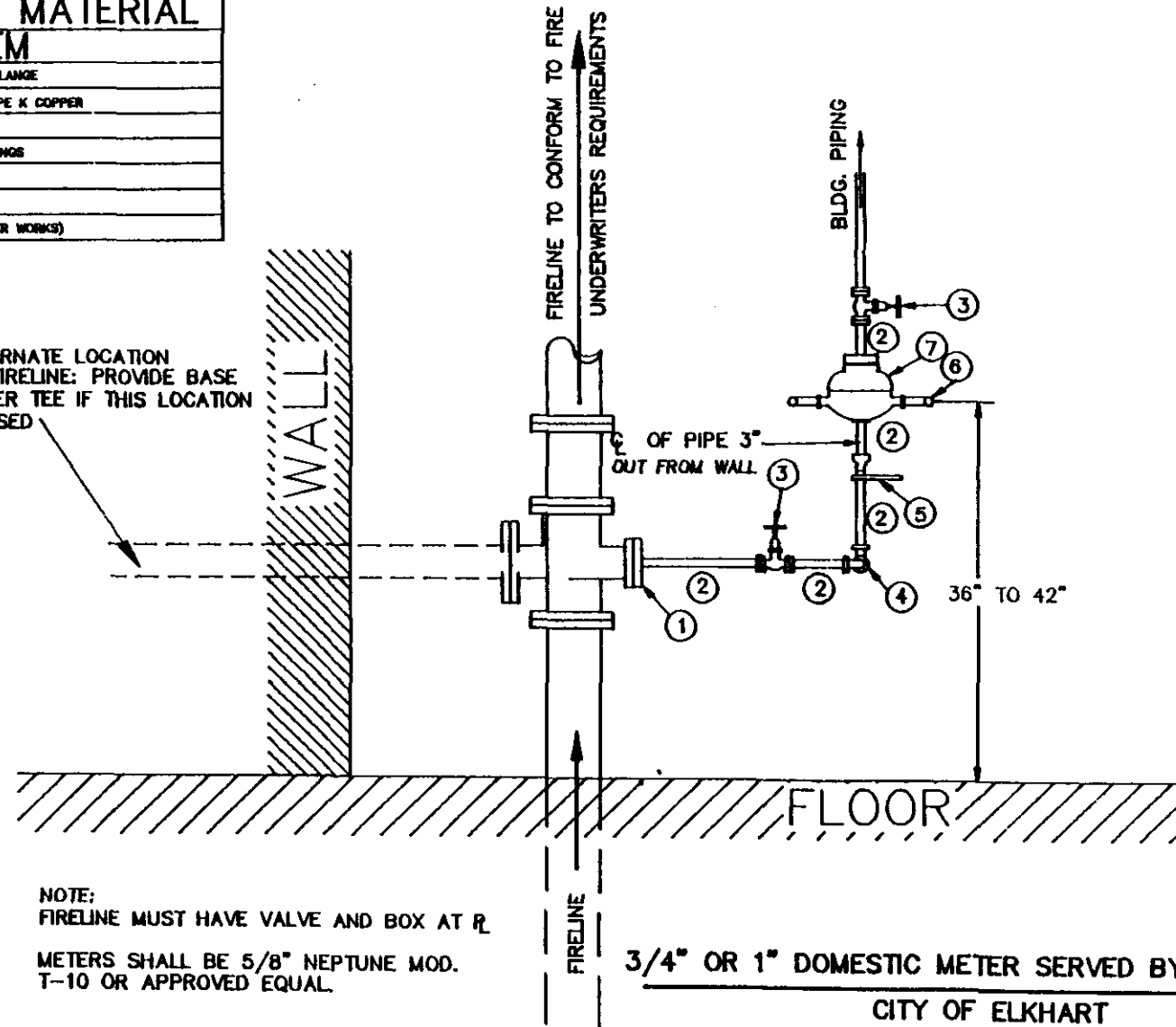
Cross Connections to water wells shall be permanently eliminated. All plumbing shall be performed by or under the direct supervision of a plumber licensed by the State of Indiana. The CONTRACTOR will obtain all needed permits and schedule the required inspection by the local agency. Plumbing shall be in accordance with the Uniform Building Code with Indiana Amendments and may be subject to local code requirements.

Where homes are found to have a water recirculating home heating or cooling system (heat pump), the project engineer will be notified so that elimination of cross connections to the potable supply lines can be properly verified or approved. (See Item 10 Well Abandonment).

The CONTRACTOR shall be responsible for scheduling interior work, well disconnection, municipal service connection and all associated work with individual property owners. The work shall be performed so as to minimize disruption of potable water supply to individual users. The CONTRACTOR will be prepared to schedule work for weekends or after normal work hours to facilitate the service connections and to resolve scheduling conflicts wherever possible.

	BILL OF MATERIAL
ITEM	
1	REDUCING COMPANION FLANGE
2	RED BRASS PIPE OR TYPE K COPPER
3	BRONZE GATE VALVE
4	BRASS OR COPPER FITTINGS
5	WALL BRACKET
6	METER HORN
7	WATER METER (BY WATER WORKS)

ALTERNATE LOCATION
OF FIRELINE: PROVIDE BASE
UNDER TEE IF THIS LOCATION
IS USED



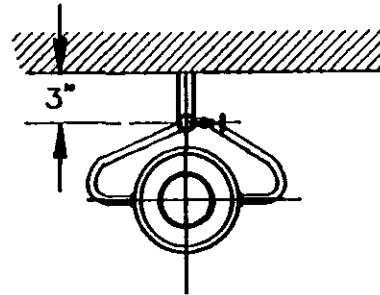
NOTE:
FIRELINE MUST HAVE VALVE AND BOX AT R.
METERS SHALL BE 5/8\" NEPTUNE MOD.
T-10 OR APPROVED EQUAL.

3/4\" OR 1\" DOMESTIC METER SERVED BY FIRELINE

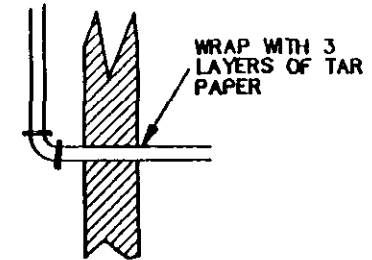
CITY OF ELKHART

NO SCALE

up

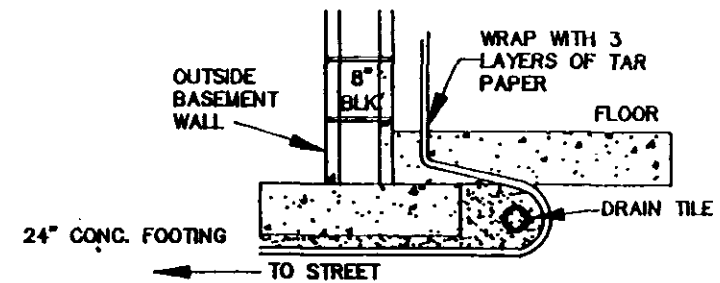
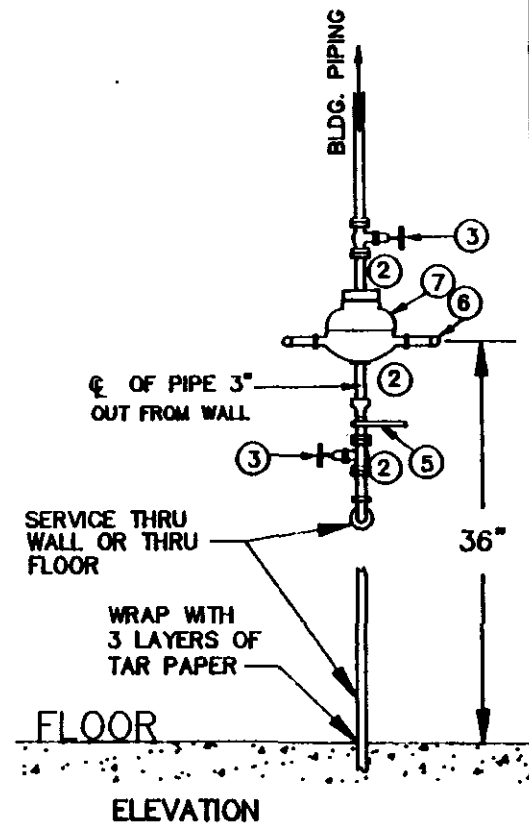


PLAN



DETAIL: SERVICE THRU WALL

BILL OF MATERIAL	
ITEM	
2	RED BRASS PIPE, COPPER
3	BRONZE GATE VALVE
5	WALL BRACKET
6	METER YOKE
7	WATER METER (BY WATERWORKS)



DETAIL: SERVICE THRU FLOOR

RESIDENTIAL METER SETTING CITY OF ELKHART

NO SCALE



ITEM 12

FIRE PUMP BUILDING
DIVISION 1 - GENERAL REQUIREMENTS

01010 DESCRIPTION

For the lump sum price bid, the Contractor shall furnish all materials and labor for the new construction of a Fire Pump Building including site improvements, general construction, utility connections, mechanical, and all other related work as required to complete the Fire Pump Building project as shown on drawings.

01040 CUTTING AND PATCHING

Each Contractor shall be responsible for his cutting and patching and making arrangements to repair work damaged during the course of his construction. No cutting of major structural components such as beams, columns, bearing plates, bearing walls, etc., shall be allowed without the Architects approval. The General Contractor shall have the right to charge Contractors to correct any item damaged and not properly repaired. Keep cutting and patching to a minimum by preplanning and communicating to assure that interrelated components are installed simultaneously.

01060 REGULATORY REQUIREMENTS

The Contractor shall obtain and pay for all permits and licenses necessary for the execution of the work.

The Contractor shall give all notices, pay all fees, and comply with all the federal, state, and local laws, ordinances, rules, and regulations bearing on the conduct of the work.

01200 PROJECT MEETINGS

Progress meetings shall be held monthly and shall be attended by all contractors as construction progress requires.

01300 SUBMITTALS

General Contractor shall submit a construction schedule for review by all Contractors and shall submit an updated schedule with each payment application. All Contractors shall submit five (5) copies of shop drawings of all manufactured building

assemblies or components for approval and shall note any deviation from specified components. Rejection of workmanship or materials by Architect shall be final.

01410 TESTING LABORATORY SERVICES

- A The General Contractor shall employ and pay for the services of an independent testing laboratory to perform specified inspection and testing as noted herein, and other tests requested by the Architect.
 - 1. Monitor the concrete quality, cylinder test, and report to all parties the results.
 - 2. Monitor the compaction of all bases for footings, slabs on grade, and foundations.
 - 3. Monitor the quality and compaction of all fills.
 - 4. Monitor the quantity of all fills if it is determined to be additional work to the contract.
- B. Retesting: The Contractor is responsible for retesting where results prove unsatisfactory and do not indicate compliance with Contract Documents, regardless of whether the original test was the Contractor's responsibility.
 - 1. Cost of retesting construction revised or replaced by Contractor is the Contractor's responsibility, where required tests were performed on original construction.

01440 PRODUCT QUALITY

Provide new products, materials, and equipment which are undamaged, unused, with complete accessories, trim, safety devices as necessary for complete installation. All products shall be of the same manufacturer, source, or "batch" as required for good project aesthetics.

01500 TEMPORARY UTILITIES

The General Contractor shall furnish offices, telephones and storage enclosures as required for their work. General Contractor will furnish electrical power 120 V. Contractors shall furnish power distribution for their use.

01710 CLEANING

Each Contractor shall be responsible for the cleanup of scraps, debris and dust created by the installation of their own work. The Owner has the right to charge the Contractor for the clean up when the Contractor fails to clean up after two written warnings. Final cleaning, vacuuming, polishing, washing, etc., will be done by General Contractor before occupancy.

01740 WARRANTIES

The Contractor shall warrant all his work for a minimum of one (1) year and longer if a product manufacturer warrants their product for a longer period. Warranties start when the local building official approves a permit for occupancy.

01800 PROJECT DOCUMENTS

As the work progresses, the General Contractor shall record on one set of drawings and specifications all changes made in the field. Changes shall be recorded when they occur, method of marking must be acceptable to the Architect and Owner. These records will be periodically inspected when the Architect visits the site. These drawings will then be turned over to the Owner at project close out.

DIVISION 2 SITE WORK

02210 SITE GRADING AND EXCAVATION

A. WORK INCLUDED

Remove existing vegetation within construction area and excavate as required for building foundation. Grading is to be done as drawings indicate. Restore site to condition equal to or greater than existed prior to start of construction.

B. PROTECTION

Protect natural areas, natural features, trees as indicated by owner to remain. Protect bench marks and underground utilities. Call "Holey Moley" 1-800-382-5544 to verify location of all utilities.

C. QUALITY CONTROLS

Soil bearing capacity is assumed 2500 psf where undisturbed, unless otherwise noted on drawings.

D. EXCAVATION

Provide approved fill where required to build up base for footings and slabs.

02220 BACK FILLING

A. CONTROLLED FILL

1. Footing concrete shall be poured to a depth required to bear on undisturbed soil or on granular fill compacted in 8" layers to 95% modified proctor density.
2. Notify local Building Official, Owner, and Architect/Engineer before proceeding with installation of controlled fill.
3. Remove and replace with controlled fill any areas that have been softened by rains, freezing, construction equipment, etc.

02281 TERMITE CONTROL

Soil Treatment: Soils below building shall be treated for termite and insect control. Furnish 1 year renewable guarantee.

DIVISION 3 - CONCRETE

03000 CONCRETE REQUIREMENTS

1.01 GENERAL

- A. Quality Control - Concrete work shall conform to all requirements of the American Concrete Institute Codes. ACI 318-83, ACI 318.1-83, ACI 531-79 or latest published codes. Notify Architect on dates of scheduled concrete pours.

B. CEMENT

ASTM C150 Type I Cement

C. No other admixtures without Architects/Engineers approval.

1.02 TESTING AGENCY

- A. Inspection and testing of concrete mix will be performed by a firm in accordance with section 01410.
- B. Three (3) concrete cylinder samples for each days pour or each 50 cubic yards of concrete whichever occurs more often.
- C. One (1) additional test cylinder will be taken during cold weather concreting, and be cured on job site under same conditions as concrete it represents.
- D. One (1) slump test will be taken for each set of test cylinders taken. Additional slump test will be taken if water is added.

2.01 PRODUCTS

- A. INTERIOR CONCRETE - (Footings, floor slabs and foundations) $f_c = 3,500$ psi (28 day cure) slump 4 1/2" maximum, natural aggregate.
- B. EXTERIOR CONCRETE - (Walks, curbs, stoops, etc.) $f_c = 3,500$ psi (28 day cure) slump 4 1/2" maximum, 4-6% air entertainment, limestone aggregate.
- C. MESH - Wire fabric ASTM A 185, 6" x 6", #10/#10 as noted.
- D. REINFORCING STEEL - $F_y = 60,000$ psi.
- E. VAPOR BARRIER - .006" (6 mil) PVC or polyethylene film, lap joints 6" minimum.

3.01 EXECUTION

- A. Install all work according to the latest ACI codes and regulations.
- B. Install control joints in walks not greater than five feet, expansion joints not greater than 50 feet, or as noted on drawings. Install control joints in curbs and exterior slabs not greater than 10 feet, expansion joints not greater than 50 feet. Install control joints in floor slabs under dividing walls where practical but not greater than 20 feet. All control joints shall be at least 1/4 the depth of concrete thickness.
- C. Trowel exterior concrete and provide broom finish at right angle to direction of pedestrian traffic.
- D. Interior concrete shall be smooth troweled and sealed with sealer. See Section 09900 for sealer.
- E. Slope floor 1/8" per foot min. to drains where indicated on drawings.

DIVISION 4 - MASONRY

1.01 GENERAL

A. QUALITY CONTROL

Concrete work shall conform to all requirements of the "Uniform Building Code" and the recommendations of the "Brick Institute of America".

- B. Face Brick shall be laid up in a standard running bond. Allow \$350.00 per 1,000 brick delivered to the site.

C. COLD WEATHER PROTECTION

When temperatures are below 40 degrees F. all materials must be heated to produce mortar and material temperatures at 40 degrees F. and maintain above freezing temperatures of the materials for a minimum of 48 hours after laying.

2.01 PRODUCTS

A. MORTAR

Type M

B. CONCRETE BLOCK

ASTM C-90 Standard Weight

C. BLOCK REINFORCING

Dur-O-Wal truss type reinforcing with #9 gauge diameter side rods.

D. FACE BRICK

Normal standard size for 3/8" joints.

E. FACE BRICK REINFORCING

Corrugated wall ties minimum 24 gauge thickness.

3.01 EXECUTION

A. LAYING MASONRY UNITS IN WALL

1. All masonry units shall be laid plumb, level and true to line. Mortar for all bed joints shall be spread thick. Slushing head joints will not be permitted.
2. Joints shall be of uniform 3/8" thickness. All exterior joints shall be cut flush as the mortar takes its initial set. Tool joints to match existing.
3. Cover tops of walls, except when work is in progress, and protect from moisture and damage.
4. Work required to be built-in with the masonry, including anchors, wall plugs and accessories, shall be built-in as erection progresses.
5. Provide all rough openings for all mechanical and electrical equipment. Chases for electrical ducts, pipes and conduits shall be built into masonry walls as required.
6. Do all cutting, drilling, and patching of work required by other trades. In the event such cutting, drilling, or patching is necessary due to the negligence of another Contractor, it shall be done at the expense of the other Contractor.

B. POINTING AND CLEANING

1. Point and fill all holes and cracks in exposed points with additional fresh mortar. If mortar has hardened, defects shall be chiseled out, wetted and refilled solidly with fresh mortar and tooled as specified.
2. Upon completion, all exterior and interior masonry work shall be thoroughly cleaned of all excess mortar and foreign matter. Use of cleaning agent shall be in accordance with manufacturers written instructions.

C. BLOCK

Install in standard running bond with wall ties every other course.

- D. Mix mortar in mechanical batchmixer at least 5 minutes. Do not use "Antifreeze" mixtures.

DIVISION 5 - METALS

05120 STRUCTURAL STEEL

1.01 GENERAL

A. SCOPE

Work includes all structural rolled shapes, fabricated section and miscellaneous anchors, plates, setting plates and access covers.

B. QUALITY CONTROL

Comply with the provision of the following standards - AISC Code of Standard Practice for Steel Building and Bridges". AISC - Specifications for the "Design Fabrications and Erection of Structural Steel Buildings" including the Commentary". AWS "Code for Welding in Building Construction".

C. SHOP DRAWINGS

Submit shop drawing of all steel items shown on the drawings and in accordance with Section 01300.

2.01 PRODUCTS

- A. Rolled steel plates shapes and bars: ASTM A36.
- B. Square, rectangular and special shapes: ASTM A501.
- C. Structural steel pipes: ASTM A120.
- D. Bolts low carbon steel: ASTM 307.
- E. Structural steel primer paint.

DIVISION 6 - WOOD AND PLASTICS

06110 FRAMING AND SHEATHING

1.01 GENERAL

A. WORK INCLUDED

Non-structural walls, wall sheathing, complete with overlay, preservative treatment of wood members where required and within accordance to code.

B. QUALITY ASSURANCE VISIBLE

Lumber to have visible grade stamp, of an agency certified by the Board of Review, American Lumber Standards Committee.

C. REFERENCE STANDARDS

AWPA C1-92-Preservative Treatment by Pressure Processes, PS 1 - Construction and Industrial Plywood, PS 20 - 70 American Softwood Lumber Standard, NFPA National Forest Products Association. National Design Specifications for stress grade lumber and its fastening.

2.01 PRODUCTS

A. LUMBER AND SHEET MATERIALS

Species shall not be mixed. Use surface dried #1 Southern Pine. Light framing shall be standard or better stud grade. Sill plates shall be in random lengths, utility grade, sill plates in contact with masonry or concrete shall be wolmanized and comply with ASPI Standard LP-2. Touch up all cuts in treated lumber.

B. LUMBER - PS20-70

Graded in accordance with NFPA Grading Rules: Maximum moisture content of 19%; surface dried, pressure treated lumber where called for on drawings.

Studs: fb = 850 psi. E = 1,400,00 psi

C. PLYWOOD

Each panel of construction and industrial plywood shall be identified with the appropriate grade trade mark of the American Plywood Association.

1. Wall and roof sheathing shall be either but not mixed:
 - a. 1/2" plywood, APA rated Sheathing, exposure 1, 32/16.
 - b. 1/2" OSB, APA rated Sheathing, exposure 1, 32/16, (Oriented Strand Board, Inner Seal OSB).

3.01 EXECUTION

A. STUDS

Construct framework with good workmanship as outlined in the Uniform Building Code. Provide cross bracing, bridging, corner bracing and fire stopping as noted in code. All joints shall be tight and true. Nail all work as a minimum by code. Construct walls plumb and true.

B. PLYWOOD SHEATHING, GYPSUM SHEATHING

Install products in strict accordance with trade association recommendations (American Plywood Association or Gypsum Association). Use plywood clips where recommended. Provide gaps in sheathing where recommended for expansion.

C. ACCESSORIES

Install all accessories where called for on drawings as recommended by manufacturer or code requirements.

06192 FABRICATED WOOD TRUSSES

A. SHOP DRAWINGS AND PRODUCT DATA

1. Submit shop drawings prior to fabrication. As noted in section 01300 of this specification.
2. Truss shop drawings shall include the truss framing plans; species and grades of lumber used; Design loading and allowable stress increase; Force analysis of each member; Pitch, span and spacing of trusses; Gauge thickness, nominal sizes and locations of connections joints; Bearing and anchorage details; Framed openings; Permanent bracing and bridging.
3. Shop drawings shall bear the seal of a professional engineer registered in the State of Indiana.
4. Submit manufacturer's instructions on lateral bracing.

2.01 PRODUCTS

A. MATERIALS

- 1) Wood Chords and Webs: PS 20-77, Graded to NFPA Rules and TPI minimum requirements.
- 2) Plates: Galvanized Sheet Steel.
- 3) Lateral Support: Recommended by Truss Manufacturer.

3.01 EXECUTION

A. CONSTRUCTION

1. Ensure members are accurately cut to length, angle and true to line to ensure tight joints. Locate plates as required by design on approved shop drawings.

B. ERECTION

1. Set and secure wood trusses level, plumb and in correct locations. Provide temporary bracing and anchorage to hold trusses in place until permanently secured. Ensure truss ends have sufficient bearing area. Install permanent bracing and bridging prior to application of loads. Cutting and altering of members is not permitted

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07200 INSULATION

1.01 GENERAL

- A. Install fiberglass batt insulation above ceiling, rigid insulation below grade, and exterior of building as shown on drawings.

2.01 PRODUCTS

A. FIBERGLASS BATT INSULATION

1. Batt insulation, foil or Kraft Faced - FS-HH-521F, Type I, Rated R-30 for above ceiling. Kraft face towards warm side of building.
2. WALL INSULATION
 - a. Rigid Insulation, HH-1-1972/GEN having six month "r" value of R-10 when conditioned according to RIC/TIMA 281-1, aging procedure. Minimum thickness of 2".
3. Below Grade Insulation
 - a. Insulation board shall meet physical property requirement HH-1-524C, Type IV, and ASTM specification C578, Type IV, with a minimum thickness of 2".

3.01 INSTALLATION

- A. Install batt insulation in accordance with manufacturers instruction; Trim insulation neatly to fit spaces, use batts free of damage. Fit insulation tight in spaces air tight to exterior side of mechanical and electrical services within the planes of insulation. Leave no gaps or voids. Box out insulation around recessed electrical fixtures.

07210 BUILDING INSULATION

1.01 GENERAL

- A. Work included - Furnish necessary labor, material and equipment for complete installation of the building insulation as shown on drawings.
- B. Acceptable Manufacturers - Celotex Building Products, Simplex Products, Dow Chemical, UC Industries, or Approved Equal by Architect.

2.01 PRODUCTS

- A. All insulation shall conform to ASTM C578-85 Type IV, D1621-73, C518-76.
- B. Insulation shall be 48 inches x 96 inches x 2 inches in thickness.
- C. Insulation shall have an aged R-value of 5.0 ft ²*h* F/BTU per inch of thickness when tested at 75 degrees F. mean temperature in accordance with ASTM C518-76.

3.01 EXECUTION

- A. Delivery, storage, and handling shall be do done in strict accordance to manufacturer's instructions.
- B. Attach building insulation to masonry walls as shown on drawings.
- C. Face brick shall go over building insulation when complete.

07319 FIBERGLASS SHINGLES

1.01 GENERAL

A. QUALITY ASSURANCE

Johns-Manville, Owens Corning, GAF, Certainteed, or approved equal by Owner.

B. MATERIALS

1. Provide 30 year prorated limited warranty.
2. Color selection by Owner.

2.01 PRODUCTS

- A. Laminated fiberglass shingles, Class A, Type 1, ASTM D 3018, D3161 240#/sq. min. self sealing U.L. listed for wind resistance.
- B. #15 asphalt saturated roofing felt. ASTM D-226-81, organic perforated, 36" wide.
- C. Hip and ridge shingles, pre-cut manufacturer's standard or job cut.
- D. Fasteners - Nails: Hot galvanized or aluminum 11 or 12 Ga. barbed shank, 3/8" head, sharp pointed conventional, of sufficient length to penetrate at least 3/4" into solid wood decking or completely through plywood sheathing.
- E. Bituminous Plastic Cement - SS-C-153 C, Type I, Class A and Type I, Class B

3.01 EXECUTION

A. APPLICATION - FELT UNDERLAYING

1. Nail metal drip edge along the bottom edge (eaves) before felt is laid and to the sides (rakes) after the felt is laid; lay one layer of felt horizontally over entire roof, lapping each course over lower course 2" minimum at horizontal joints, and 4" side lap at end joints; lap felt 6" from both sides over hips and ridges. Secure as required.
2. For winter ice-dam protection applications: Over the felt apply an eave flashing strip of 90# mineral surfaced rolled roofing or 50 lb roll roofing to overhang drip edge 1/4" and extend to a point 24" minimum inside the interior building and cement to the underlayment felt. If horizontal lap is required, it must occur outside the wall line.

B. STEP FLASHING

1. Used on the sides of chimneys and roof windows. Cut metal flashing pieces of 7" x 10" and bend in half, 7" x 5" each side; nail each flashing piece to the roof at the top edge with two roofing nails.

Apply shingles on top of metal set in black plastic cement; to allow for possible roof movement, do not nail flashing to chimney or roof window. Carry a metal cap or the wall siding material down over the step flashing. Minimum flashing overlap shall be manufacturer's printed instructions.

C. SHINGLE INSTALLATION

1. Install in strict accordance with manufacturer's instructions.

07631 GUTTER AND DOWNSPOUTS

1.01 GENERAL

- A. Furnish all labor, materials, and equipment required to complete installation of aluminum pre-finished gutters and downspouts and related work indicated on drawings or specified herein.
- B. Submit color selection for owners approval. See Section 01300.

2.01. PRODUCTS

A. MATERIALS

1. Gutters shall be pre-finished aluminum with minimum thickness of material .032 inches.
2. Downspouts shall be pre-finished aluminum with minimum thickness of material .024 inches.

B. All accessories shall have the same finish as the gutters and downspouts.

3.01 EXECUTION

A. Before starting work, verify governing dimensions at building.

B. Installation shall be in strict accordance to manufacturer's written instructions.

C. Upon completion, the contractor shall clean all aluminum work.

07715 ALUMINUM FASCIA AND SOFFITS

1.01. GENERAL

A. WORK INCLUDED

Preformed and prefinished aluminum soffit system 100% perforated type and solid fascia.

B. ACCEPTABLE MANUFACTURERS

Norandex, Alcoa, Alside - Other manufacturer's will be accepted if they meet these specifications and approved by Architect.

C. WARRANTY

Fascia must be warranted not to peel, crack, flake or blister for a period of 30 years.

2.01 MATERIALS

- A. Soffits to be .019" thick 100% vented type; ribbed for added strength and rigidity and to eliminate waves. Color selection by owner.
- B. Fascia - Shall be min .024" thick. Color selection by owner.
- C. Accessory Components - Fascia, soffits and all components to make installation complete.

3.01 EXECUTION

A. INSTALLATION

Install soffit and fascia in accordance with manufacturer's recommendations. Securely fasten in place, properly aligned, leveled and plumb.

07725 RIDGE VENTS

1.01 GENERAL

- A. Furnish all labor, materials, and equipment required to complete installation of this section.

2.01 PRODUCTS

A. ACCEPTABLE MANUFACTURERS

Cor-A-Vent, Inc., or approved equal by Architect.

B. MATERIALS

- 1. Ridge vent shall provide 18 square inches of net free vent area per lineal foot.
- 2. Provide end caps where required at termination ends.

3.01 EXECUTION

A. INSTALLATION

1. Before start of installation field verify dimensions, clean, repair, if necessary, any adjoining work on which this work is in anyway dependent for its proper installation.
2. Install strict accordance to manufacturer's instructions.
3. Upon completion contractor shall clean all work; Remove all scrap materials from job site.

07615 ROOF FLASHING AND SHEET METAL

1.01 GENERAL

- A. Furnish all labor, materials, and equipment to make a complete installation of this section.
- B. Color selection: submit color samples in accordance to Section 01300.

2.01 PRODUCTS

A. MATERIALS

1. Minimum thickness of material shall be 16 aluminum.
2. One side shall have a factory finished coating.

3.01 EXECUTION

- A. Before starting work, verify governing dimensions.
- B. Installation shall be in strict accordance to the manufacturer's written instructions.
- C. Upon completion, the Contractor shall clean up all debris for his work.

07900 SEALANTS

1.01 GENERAL

A. WORK INCLUDED

1. It is the intent of this specification to ensure that the building is weathertight and all areas requiring caulking and sealing shall be done.

B. WARRANTY

1. Provide 10 year warranty. Replace sealants which fail because of loss of cohesion or adhesion, or do not cure.

2.01 PRODUCTS

A. SEALANT MATERIALS

1. Caulk Sealant to be Sonneborn Sonolastic NP1, Gun Grade Urethane Sealant which is Class 25 non-staining, elastic, waterproof and colored to match the adjoining materials or equal as approved by the Architect.

B. INTERIOR SEALANTS

1. Caulking material shall be DAP Caulking (FS-TTC-598B, Type 1) around doors, windows, and floor lines.

3.01 EXECUTION

A. INSPECTION

Verify joint dimensions, physical, and environmental conditions are acceptable to receive work of this section.

B. PREPARATION

Clean, prepare and size joints in accordance with manufacturer's instructions. Remove any loose materials and other foreign matter which might impair adhesion of sealant.

C. INSTALLATION

Install sealant in accordance with manufacturer's instructions; apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature ranges.

DIVISION 8 - DOORS AND WINDOWS

08100 METAL DOORS

1.01 GENERAL

A. WORK INCLUDED

Standard hollow metal insulated exterior door, jambs and hardware. See drawings for sizes, location and details.

- B. REFERENCE OF STANDARD ASTM A-366-72, and free of scale, pitting, or other surface defects. Face sheets shall be not less than 16 gauge and shall be zinc-coated, and chemically treated for paint adhesion.

2.01 PRODUCTS

A. DOORS

1. Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door. All such welds shall be ground, filled, and dressed smooth.
2. Doors shall have 1/8" bevel in 2" on hinge and lock edges.
3. The core of the door shall be filled with 1 1/2 pound density polyurethane. Reinforcing plates or channels shall be at all points where hardware connects to door. Reinforcing plates or channels of 14 gauge shall be at all points where hardware connects to door.

3.01 EXECUTION

A. INSTALLATION

Install doors plumb and square, according to manufacturer's instructions.

B. GUARANTEE

Manufacturer shall guarantee their door for minimum period of one year.

08110 STANDARD STEEL FRAMES

1.01 GENERAL

A. SCOPE OF WORK

Furnish all labor, materials, and equipment required to complete installation of hollow metal door frames as shown on drawings.

- B. Submit product data in accordance with Section 01300. This should include general construction, jointing methods, reinforcements, anchorage methods, hardware locations and installation details.

2.01 PRODUCTS

A. ACCEPTABLE MANUFACTURERS

Steelcraft, Amweld, Republic or approved equal by Architect.

B. FABRICATION

1. Frames shall be manufactured from 16 gage cold-rolled steel with a minimum 2" face.
2. Mitered corners shall be reinforced with a corner clip to provide a firm interlock of jambs to head.
3. Frames shall be supplied with factory installed rubber bumpers (3) per strike jamb and (2) per head.
4. Steel hinge reinforcements shall be minimum of 8 gauge steel.
5. Strike jamb shall have minimum 16 gauge steel strike reinforcements.

3.01 INSTALLATION

1. Verify openings for compliance with plans and shop drawings.
2. Install metal frames in accordance with strict manufacturer's specifications or written instructions.
3. Remove all debris from opening and wipe frames to clean dust or other foreign material from the frame.
4. Repair or replace any frames shown to be defective or damaged prior to project close-out as stated in manufacturer's warranty.

08510 STEEL WINDOWS

1.01 GENERAL

A. SCOPE

1. Install new steel window, blocking and trim, including all necessary anchors, attachments and shims.

B. SUBMITTALS

1. Submit product data in accordance with Section 01300. This shall include general construction, anchoring methods, installation details and color samples.

2.01 PRODUCTS

A. ACCEPTABLE MANUFACTURERS

D.V. Fyre - Tec, Inc., Hopes Architectural Products, Inc., or approved Equal By Architect.

B. FABRICATION

1. Window frames shall be of lock seamed tubular role form from 22 gauge cold rolled hot dip galvanized steel.
2. Frames and inserts shall be welded on both sides at all corners to facilitate drop in glazing.
3. Weatherstripping shall be of the finest grade resilient materials. Weatherstripping shall be of polypropylene type design with continuous vinyl flapper.
4. Glazing shall be 3/4" insulated glass.
5. Finish shall be a pre-finish baked on enamel paint.

3.01 EXECUTION

A. INSTALLATION

1. Windows to be installed in strict accordance to the manufacturer's written instructions or specifications.
2. All joints between the window frame and the construction shall be caulked as indicated in Section 07900.
3. After installation, protect window from damage during subsequent construction activities.
4. Metal surfaces of windows shall be cleaned both inside and outside of all mortar, plaster, spackle, and other foreign matter to present a neat appearance and prevent a fouling of weathering surfaces, and weatherstripping.
5. Windows shall be washed off with a soft fiber, soap and water, and thoroughly rinsed with clear water. Scratched or marred surfaces shall be touched up by the Contractor prior to owners acceptance of the building.

08700 HARDWARE

1.01 GENERAL

A. WORK INCLUDED

1. Hardware for doors as specified herein or as noted on drawings.
2. Thresholds, weatherstripping, closures as specified herein or as noted on schedule.

2.01 PRODUCTS

A. Provide items as listed in schedule. Complete to function as intended.

B. Acceptable Manufacturer's

Locksets - Schlage, Series "A"
Hinges - McKinney, Ball Bearing
Closures - LCN
Stops - Ives, Wall Mounted
Thresholds - National Guard, #896
Weatherstrip - By Aluminum Door Manufacturer

3.01 EXECUTION

A. Install hardware in accordance with manufacturer's recommendations, using proper templates.

08655 ROOF WINDOWS

1.01 GENERAL

A. WORK INCLUDED

Installation of all roof windows, including flashing, insect screen. All roof windows shall be manually operable.

B. QUALITY CONTROL

Conform strictly to the requirements of the NWWDA (National Wood Window and Door Association) Standard IS-7 and ASTM E283, E547, E330.

2.01 PRODUCTS

A. ACCEPTABLE MANUFACTURERS

Roto or Approved Equal by Architect.

- B. Exterior finish of windows shall be prefinished aluminum. Color selection by Owner.
- C. Counter flashing shall be provided by manufacturer of window.
- D. Glazing shall be laminated tempered double pane insulating glass. The glazing shall have a tint of bronze and a low "E" value.
- E. Insect screen shall be a fiberglass, cloth mounted according to manufacturer's written instructions.

3.01 EXECUTION

- A. Install roof windows in strict accordance with manufacturer's instruction.
- B. After installation clean all surfaces in accordance with manufacturer's instructions.
- C. Provide manufacturer's guarantee to owner.

DIVISION 9 - FINISHES

09250 GYPSUM WALLBOARD

1.01 GENERAL

A. WORK INCLUDED

Work included in this Section consists of furnishing all labor, material, equipment, and incidentals required for complete installation of gypsum board.

B. QUALITY ASSURANCE

1. Perform work in accordance with GA201 - Gypsum Board for walls and ceilings, GA216 - Recommended Specifications for the Application and Finishing of Gypsum Board and GA600 - Fire Resistance Manual, Gypsum Association.

2.01 PRODUCTS

A. ACCEPTABLE MANUFACTURERS

United States Gypsum, Gold Bond, or Approved Equal by Architect.

B. MATERIALS

1. Moisture Resistance Gypsum Board 5/8" thick maximum as noted on drawings.

3.01 EXECUTION

- A. Install Gypsum wallboard in accordance with recommendations of GA201, GA216, and GA 600; erect single layer Gypsum board in direction most practical and economical, with ends and edges occurring over firm bearing.

09900 PAINTING

1.01 GENERAL

A. SCOPE

1. Work included in this Section consists of furnishing all labor, materials, equipment, and incidentals required for complete painting and finishing work required for decoration or protection, mentioned or scheduled on the drawings and/or herein, including surface preparation and finishing of exposed/unexposed wood, ferrous metal, galvanized ferrous metal, aggregate masonry, gypsum board, and other surfaces as required to decorate the work limits completely, both interior and exterior.
2. Paint coats specified herein shall be in addition to shop prime coats provided by other trades or contractors under their portion of the work.

3. Exposed mechanical, electrical work, such as piping, conduit, grilles, registers, convertor fronts, etc., in decorated areas shall be painted in general, to match adjacent surfaces, unless otherwise directed.

B. SUBMITTALS

1. Provide data on all finishing products and special coating in accordance with section 01300.

C. ENVIRONMENTAL REQUIREMENTS

1. Delivery to the job site shall be in unopened, labeled manufacturer's original containers; only approved materials shall be delivered to site.
2. Storage of all painting and finishing materials shall be in a single designated place, kept neat, clean. Remove oily rags and waste every night. Take all precautions to avoid fire.
3. Maintain temperature in building at constant 65 degrees F. or above during installation of drywall, masonry, and provide adequate ventilation for escape of moisture from building in order to prevent mildew, damage to other work and improper drying of paint. Once painting has commenced, provide constant temperature of 65 degrees F. or above. Maintain surface temperatures at 5 degrees F. above the dew point temperatures while preparing the surface and painting, and prevent variations in temperature which might result in condensation on freshly painted surfaces. Before painting is started in any area, vacuum clean and remove excessive dust. Do not broom clean during painting operations.

E. WARRANTY

1. Furnish in approved written form, a warranty for all work under this Section against cracking, crazing, peeling, blistering, burning through, aligating, chalking, and other defects for a period of two (2) years from date of final acceptance. Contractor shall make good without expense to Owner any defects appearing within this period.

2.01 PRODUCTS

A. MATERIALS

1. Manufacturers of paint materials listed below shall determine type and quality of paint materials to be used as hereinafter specified. Materials of other manufacturers may be used, subject to approval of Architect/Engineer, provided they are fully equivalent to materials specified in every respect. Provide proposed brand names, uses, together with substantiating data as required to establish equivalence to materials specified. Materials applied to any one surface (primers, sealers, undercoaters, finishes, etc.) shall be by the same manufacturer unless otherwise specified. Compatibility of materials shall be responsibility of paint contractor.
 - a. Sherwin-Williams Company
 - b. Pratt & Lambert, Inc.
 - c. Glidden Company
 - d. Pittsburgh Plate Glass Company
 - e. Benjamin Moore Company
 - f. Devoe Paint & Varnish Company
2. Block Filler shall be Glidden "Blockaid" masonry block filler or P & L "Primafil" or equal.

B. FINISHES

1. Refer to schedule at end of Section for surface finish schedule. Colors shall be as selected by Architect/Engineer.

3.01 EXECUTION

A. EXAMINATION AND PREPARATION

1. Verify that substrate conditions are ready to receive work.
 - a. Inform Architect in writing if conditions for new work are unacceptable.
 - b. New substrate shall be properly primed/prepared for finish work.
 - c. Existing substrate shall be cleaned; be free of foreign material which would affect performance/appearance of new finish.
 - d. Existing areas of cracked, crazed or peeling paint shall be thoroughly removed as required with method acceptable to substrate. Areas shall be primed/prepared as required for new finish.
 - e. Commencement of work indicates acceptance of conditions of substrate and becomes responsibility of this trade.
2. Correct minor defects and clean surfaces which affect Work of this Section.
3. Preparation of materials shall be in strict accordance with manufacturer's written directions. Thinning, when approved by Architect/Engineer shall be done with materials recommended by paint manufacturer, using minimum amounts, not exceeding manufacturer's allowable maximum.
4. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.
5. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
6. Concrete and unit masonry surfaces scheduled to receive paint finish: remove foreign matter. Remove oil and grease with a solution of tri-sodium phosphate, rinse well and allow to dry.

7. Uncoated ferrous surfaces: remove scale by wire brushing or sandblasting; wash clean with solvent. Apply treatment of phosphoric acid solution.
8. Shop primed steel surfaces: sand and scrape to remove loose primer and rust, feather edges; clean surfaces with solvent. Prime bare steel surfaces.
9. Interior wood items scheduled to receive paint finish: wipe surface clean; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

B. APPLICATION

1. Apply products in accordance with manufacturer's instructions. Employ skilled mechanics.
2. Sand transparent finishes lightly between coats to achieve required finish.
3. Where clear finishes are required, tint fillers to match wood.
4. Back prime interior and exterior woodwork scheduled to receive paint finish with primer paint.

C. FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

1. Color code items in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
2. Paint shop primed equipment.
3. Remove unfinished louvers, grilles, covers, and access panels and paint separately. Paint dampers exposed behind louvers, grilles, to match face panels.
4. Paint exposed conduit and electrical equipment occurring in finished areas, except prefinished surfaces.
5. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.

D. CLEANING

1. As work proceeds, promptly remove spilled, splashed, or spattered finishes.

E. SCHEDULE - EXTERIOR SURFACES

1. New Wood - Painted
 - a. One coat - premium quality long-oil, alkyd-based primer sealer.
 - b. Two coats - alkyd exterior enamel, "Eggshell Lustre" finish.

F. SCHEDULE - INTERIOR SURFACES

1. Wood - Painted
 - a. One coat latex enamel primer sealer.
 - b. Two coats latex eggshell enamel.
2. Concrete Floors
 - a. Two Part Lapidolith.
3. Concrete Masonry
 - a. One coat block filler.
 - b. One coat primer sealer latex.
 - c. Two coats latex eggshell enamel.
4. Ferrous Metal - Unprimed
 - a. One coat zinc chromate or zinc rich primer.
 - b. Two coats alkyd semi-gloss enamel.
5. Plaster, Gypsum Board
 - a. One coat latex primer sealer.
 - b. Two coats latex eggshell.

DIVISION 10 - SPECIALTIES

10200 LOUVERS AND VENTS

1.01 GENERAL

- A. Provide all materials, labor and equipment necessary to complete installation of vents and color samples for owners selection.
- B. Submit product data in accordance to Section 01300.

2.01 PRODUCTS

A. ACCEPTABLE MANUFACTURERS

Airstream Products Division, Arrow Louver and Damper, Inc., Air Louvers, Inc. or approved equal by Architect.

B. MATERIAL

- 1. Frames shall be fabricated of aluminum, Alloy 6063-T5, finish selection by owner
- 2. Blades shall be fabricated of aluminum, Alloy 6063-T5, finish selection by owner.
- 3. Louvers shall have factory installed aluminum insect screen.

3.01 EXECUTION

A. INSTALLATION

- 1. Install in accordance to manufacturer's written instructions.

10520 FIRE PROTECTION

1.01 GENERAL

- A. Work under this section includes all fire extinguisher, and brackets as specified by the NFPA 10 Code, "Portable Fire Extinguisher".
- B. Submit brochure of materials and installation details in accordance with Section 01300.

2.01 PRODUCTS

A. QUALITY ASSURANCE

1. Provide new portable fire extinguisher which are U.L. listed and bear UL "Listing Mark" for type, rating, and classification of extinguished indicated. The number and location for which will be determined by local codes.

B. MANUFACTURER

1. J.L. Industries, Larsens Manufacturing Co., or approved equal.

C. FIRE EXTINGUISHER

1. Multi-purpose dry chemical with a UL rating, 3A-40BC with hanger.

3.01 EXECUTION

A. INSTALLATION

1. Install items in this section in locations and at mounting heights indicated, or if not indicated at heights to comply with local building codes.
2. Install in strict accordance with manufacturers written instructions.

B. FINAL INSPECTION

1. Check extinguisher for proper charge and insure each extinguisher is in proper operational order.
2. Remove and replace any damaged, defective or under charged units.

DIVISION 11 - EQUIPMENT

(NOT USED)

DIVISION 12 - FURNISHINGS

(NOT USED)

DIVISION 13 - SPECIAL CONSTRUCTION

(NOT USED)

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DIVISION 15 - MECHANICAL

15010 HEATING, VENTILATING, PLUMBING

1.01 GENERAL

A. DESCRIPTION OF WORK

Provide all required labor, materials, equipment and Contractor's services necessary for complete installation of Mechanical Work in full conformity with requirements of all contract documents including in general, but not limited to the following:

1. Heating System
2. Ventilating System
3. Plumbing System

B. CODES, RULES AND REGULATIONS

All work shall be furnished and installed in strict accordance with all national, state, and local codes, rules, and regulations, etc., as applicable. Included, but not limited to, shall be the requirements of UL, AGA, National Electrical Code and " NFPA Bulletins, latest editions in force at time of bidding.

C. DRAWINGS

Drawings are generally diagrammatic and indicative of work to be installed. Run and arrangement of ductwork and piping; approximately as indicated, subject to modifications as required to suit conditions at building, to avoid interference with work of other trades or for proper, convenient, and accessible location of all parts of ductwork and piping systems.

D. INSTALLATION

Furnish all ductwork and piping required to make apparatus connected, complete and ready for regular operation. Unless otherwise noted, connect all apparatus and equipment in accordance with manufacturer's standard details, as approved.

2.01 PRODUCTS

A. DRAIN, WASTE, AND VENT LINES

Drain, waste and vent line to be of service weight galvanized schedule 40 wrought steel pipe (ASA B-36, 10-1950) with cast iron drainage fittings (ASA B-16, 12-1953) or type DWV copper water tube. Schedule 40 PVC pipe may be used for all drain waste and vent lines except those passing through fire walls.

B. ESCUTCHEONS

Provide exposed pipes in finished areas, both bare and covered, with approved type escutcheons where they pass through walls, partitions, floors or ceilings; on bare pipes, held in place by set-screws and on covered pipes by internal spring tension.

C. DUCT WORK

Duct work shall be galvanized steel, unless otherwise noted, installed as recommended in current issue of SMACNA Manual.

D. SHOWER AND EYE/FACE WASH

Shower and eye/face wash unit shall be Speakman model WW-10088 with the foot pedal option, model WW-22085.

3.01 EXECUTION

A. PROTECTION

Contractor shall be responsible for work and equipment until finally inspected, tested and accepted. After delivery and before and after installation, protect work against theft, injury or damage. Carefully store materials and equipment received on site which are not immediately installed. Close open ends or work with temporary covers or plugs during construction or prevent entry of obstructing material. Any extra cost occasioned by contractor's negligence in this respect will be his responsibility.

B. INSTALLATION

Install all materials and equipment according to manufacturer's recommendations and state codes.

C. WARRANTIES

Provide Owner with copies of all equipment warranties, and all operating instructions.

ITEM 13

FIRE PUMP AND APPURTENANCES

For the lump sum bid the CONTRACTOR shall furnish and provide all labor, materials, fittings joint materials, piping, valves, gages, sensors, flow meters, horizontal centrifugal single stage pump, drive, and controller to meet the following specifications.

Fire Pump

All components of the pump shall be the product of one manufacturer. The pump, driver and controller shall be installed as recommended in the current edition of the National Fire Protection Association (NFPA) Pamphlet 20, Standard for the Installation of Centrifugal Fire Pumps.

The CONTRACTOR shall furnish and install a horizontal centrifugal single stage pump specifically labeled for fire service to meet the following conditions. All components of the pump shall be the product of one manufacturer.

The fire pump shall be designed to deliver 2,500 U.S. gallons per minute (gpm) at a total differential pressure of 60 psi. The fire pump shall also be capable of delivering not less than 150% of rated flow at not less than 65% rated head. The shut off head shall not exceed 120% of rated head. Pump shall be furnished with drive, controls and accessories as detailed in this specification. Pump manufacturer shall have unit responsibility for the proper operation of complete unit assembly as indicated by field acceptance tests.

The suction supply for the fire pump shall be from a public service water main at a maximum pressure of 80 psi and a minimum pressure of 30 psi. The pump casing shall be cast iron with 10 inch 250 pound rating suction and 8 inch 250 pound rating discharge flanges machined to American National Standards Institute (ANSI) dimensions.

A field acceptance performance test shall be conducted upon completion of pump installation. The test shall be made by flowing water through calibrated nozzles, approved flow meters or other such accurate devices as may be selected by the City of Elkhart. The test shall be conducted as recommended in NFPA Pamphlet 20 by the installing CONTRACTOR in the presence of the City of Elkhart and with the authority's final approval and acceptance. Failure to submit documentation of factory and field tests will be just cause for equipment rejection.

The CONTRACTOR shall furnish and install each electric motor drive to conform to current standard NEMA codes.

The pump driver shall be horizontal foot mounted ball bearing induction motor with open drip-proof NEMA enclosure for operation on 3 phase, 60. Hertz 480 volt service. The motor shall be mounted on a steel base common to the pump and shall be connected to the pump with a coupling protected by a suitable guard. The fire pump manufacturer shall accurately align the pump and motor shafts prior to shipment. After field installation, but prior to grouting the base, a millwright or similarly qualified person shall check and verify or correct the shaft alignment.

The automatic electric motor shall be UL listed specifically for fire pump service. The controller shall be designed for across-the-line type starting. The controller shall be rated for 125 horsepower. The controller shall be capable of interrupting a short circuit current at least equal to the available short circuit current in the controller supply circuit. This fire pump controller installation requires an interrupting capacity of not less than 30,000 amps RMS symmetrical at an operating voltage of 480 volts. The controller shall be provided with a time clock for weekly automatic test, timing relay for automatic stop and pump room audible and visual alarm signals. The controller shall be floor mounted for electrical connection to the motor by the equipment installer.

A pressure cutoff switch shall be mounted in the suction line of the pump. This switch shall automatically turn off the electric motor if pressure in the line falls below 20 psi.

Valves, Piping and Fittings:

The CONTRACTOR shall install the piping, valves and fittings as shown on the drawings and connect to the existing 16" water main.

The pipe installed shall be ductile iron pipe (DIP) conforming to ANSI Specification A21.51, with a minimum wall thickness of 0.38 inches.

In all cases where the piping passes through the outside walls of the new structure across excavated areas which have been carried below the pipe lines, the CONTRACTOR shall take special precautions in compacting the backfill as it is placed beneath the level of the pipes; or provide compacted granular fill or suitable pipe supports, all in a manor which will prevent any damaging stress or strain to the pipe due to subsequent earth loads and settlement. Concrete pipe supports shall be provided where shown on the plans.

The pump manufacturer shall furnish piping accessory items for the pump installation which will adapt the pump connections to the fire protection system and test connection as follows: Fittings subjected to pump discharge pressure shall be ANSI 250 pound rating. Fittings subjected to suction pressure shall be ANSI 250 pound rating. Eccentric tapered suction reducer, concentric tapered discharge increaser, hose valve test head, hose valves with caps and chains, pump casing relief valve, automatic air release valve, Ball drip valve, suction and discharge pressure gauges.

The pressure gage located on the discharge line shall be a 3 1/2" oil filled pressure gage capable of reading a range visually of 0 to 150 psi. A pressure sensing transmitter shall be located on the same fitting and shall be capable of sending a 4-20 ma signal for a range of 0 to 150 psi to the remote terminal unit for remote monitoring of pressure. The pressure transmitter shall be the Signiture model 2408-10B.

Gate Valves:

The gate valves to be furnished and installed under these items shall comply with all applicable provisions of the latest revision of AWWA Standard C509-87, Standard for Resilient Seated Gate Valves. Wedge shall be constructed of ductile iron, fully encapsulated in synthetic rubber except for guide and wedge nut areas. Wedge rubber shall be molded in place and bonded to the ductile iron portion, and shall not be mechanically attached with screws, rivets, or similar fasteners. Wedge shall seat against surfaces arranged symmetrically about the centerline of the operating stem, so that seating is equally effective regardless of direction of pressure unbalance across the wedge. All seating surfaces in body shall be inclined to the vertical at a minimum of 32 degrees (when stem is in a vertical position) to eliminate abrasive wear of rubber sealing surfaces. Stem shall be sealed by at least two O-rings; all stem seals shall be replaceable with valve wide while open and subjected to full rate pressure. Waterway shall be smooth and shall have no depressions or cavities in seal area where foreign material can lodge and prevent closure or sealing. Valve body and bonnet shall be epoxy coated, inside and out. Valves shall be of the O.S. & Y. type except where noted, with handwheels, shall open to the left, and shall be provided with 250 pound American National Standard flanges.

Check Valves:

The check valve of the size shown on the plans shall be of the horizontal, flow through type. The body shall be of cast steel with bronze seat, plug, and guide bushing and a stainless steel spring. The check valves shall be APCO series 600 globe style with 250 pound American National Standard Flanges.

Pipe Supports:

Steel pipe supports shall be provided as necessary to support all piping in the pump building. The pipe supports shall be painted black in accordance with the painting specification provided under fire pump building.

Flowmeter:

The CONTRACTOR shall install the flowmeter as shown on the drawings. The flowmeter shall be a Fisher & Porter Series 10D1465 magnetic flowmeter of the size indicated on the drawings. A series 50XM1000 signal converter shall also be provided to achieve the

maximum flow accuracy. The flowmeter electronics shall be mounted remote from the meter and adjacent to the remote terminal unit. The meter shall be provided with a polyurethane liner.

Signage: All signage required by the Occupational Safety and Health Administration (OSHA). This shall include at a minimum:

1. "Danger - Chlorine Gas" on entrance door to fire pump room.
2. "Danger - Moving Machinery" on entrance door to fire pump room.
3. "Danger - 480 Volts" on electric panel.
4. "Danger - Starts Automatically" on fire pump motor.
5. "Notice - Fire Pump Bypass" above storz connection.
6. "Notice - Fire Pump Test Header" above eight hose header.
7. "Fire Extinguisher" above fire pump room fire extinguisher.

Sign numbers 1, 2, 3, 5, 6 shall be 14"x10" in size and made of 0.063" aluminum with a baked enamel finish. Sign number 4 shall be 14"x10" in size and made of pressure sensitive vinyl. Sign number 7 shall be 4"x20" in size and made of plastic.

ITEM 14

CHLORINATION SYSTEM

For the lump sum price bid for the chlorination system, the CONTRACTOR shall furnish all materials and do all work necessary to install complete the chlorination system in the fire pump building as shown on the plans and as herein specified, except for work specifically included under other contract items.

Work Included Under Other Contract Items

Plant Piping and valves
Flow Metering Equipment
Electrical
Control System

Work Included

The Contractor shall furnish and install as shown on the plans and described herein a complete gas chlorination system. The system shall be a flow-proportional chlorination system utilizing a flow meter, and shall include the chlorinator, automatic controller, vacuum regulators, booster pump, scales, two full 150 pound cylinders of chlorine gas, all piping, valves, and controls, injector, chlorine residual analyzer, chlorine gas leak detector, 30-minute self-contained breathing apparatus (SCBA) and case and all other items required for a complete and functioning gas chlorination system. The booster pump shall be installed such that when it is operating, the chlorination system is feeding chlorine and when it is off, the chlorination system is off. The booster pump shall be energized when the flow meter indicates the water main is flowing. The chlorination system shall be an automatic switch over system having a normal maximum capacity of 10 PPD. The chlorination system design shall provide for conveying the gas under vacuum from the cylinder mounted vacuum regulators through to the injector-check valve assembly to insure complete system safety. All springs used in the chlorination and switch over module shall be of tantalum alloy.

The rate of chlorine feed shall be set automatically by the flow-proportional controller.

The system shall include the following major components: two (2) cylinder mounted automatic switch over vacuum regulators, two (2) 10 PPD chlorinators (one is a spare), one (1) automatic controller, two (2) injector assemblies (one is a spare), one (1) two cylinder scale, two (2) booster pumps (one is a spare), one (1) chlorine residual analyzer, one (1) chlorine gas leak detector and one (1) 30-minute SCBA with case.

Vacuum Regulators

The vacuum regulators shall be chlorine gas cylinder mounted by means of a positive yoke type, gasket connection. Each regulator shall have a capacity of 10 pounds of chlorine feed per day and be supplied with a trap and filter. Both regulators shall be capable of automatic switch over to the second regulator. The regulators shall be supplied with 20 lead gaskets.

Chlorinators

The chlorinators shall be Wallace & Tiernan V-75 v-notch chlorinators with 10 pound per day capacities. One chlorinator shall be installed in the chlorination system and one shall be provided as a spare unit.

Automatic Controller

A Wallace & Tiernan V-notch controller with v-notch actuator shall be provided for automatic flow-proportional control of the chlorinator. The chlorinator and controller shall be mounted on a chlorine resistant panel. The controller shall be wired to the magnetic flow meter in the fire pump station for flow-proportional control and to the chlorination system booster pump to shutoff the booster pump when a no flow signal is received. The controller shall be capable of transmitting a 4-20mA signal to the remote terminal for indication of the chlorinator feed rate at the City of Elkhart North Main Street Well Field.

Injector Assembly With Diffuser

Two injector assemblies with diffusers shall be provided, one for installation and one spare unit. The injector assemblies shall be of the chlorine water solution type and shall create the vacuum required for operation. The assemblies shall be equipped with a check valve to prevent water from entering the system and with a drain relief for additional backflood prevention.

Cylinder Scale

A Wallace & Tiernan series 50-350 two-cylinder scale shall be provided. The scale shall be provided with the analog-output option and wired into the remote terminal unit so that the cylinder weights can be monitored at the City of Elkhart North Main Street Well Field.

Cylinder Storage Area

Cylinder storage areas for four full and four empty cylinders shall be provided as shown on the plans. These areas shall be equipped with a restraining chain attached to the wall and capable of restraining cylinders. Each area shall have a sign mounted to the wall designating empty or full cylinders as noted under "Accessories" of this specification.

Booster Pumps

Two Aurora one and a half horsepower booster pumps with mechanical seals and bronze ring construction shall be provided, one for installation and one spare unit. The booster pumps shall produce at least 7.5 gallons per minute with 90 psi back pressure. The booster pump shall be wired to shutoff when the automatic chlorinator controller indicates a no flow condition.

Chlorine Gas Leak Detector

Provide one Wallace & Tiernan series 50-135 chlorine gas detector. The gas detector shall be mounted in the fire pump room as shown on the plans with the sensor mounted in the chlorination room. Relay outputs will activate a "Warning" at 1 PPM and an "Alarm" at 3 PPM. These alarms shall also be wired into the remote terminal unit for monitoring at the City of Elkhart North Main Street Well Field.

Chlorine Residual Analyzer

Provide a chlorine residual analyzer for wall mounting wired to transmit the chlorine residual to the Master Control Panel which will relay the information to the City of Elkhart North Main Street Well Field. The residual analyzer shall be a Wallace & Tiernan Depolox 3 Analyzer. The analyzer shall be provided with the Wallace & Tiernan circular-chart recorder with a range of 0 to 2 mg/l and a year supply of 7-day charts.

Emergency Self-Contained Breathing Unit

Provide one MSA Ultralite II Air Mask with low pressure fully wound composite II cylinder rated for 30 minute duration and one wall mounted yellow Encon SCBA wall case to be mounted in the location shown of the plans.

Accessories

The following accessory equipment shall also be provided:

- a painted steel wall cabinet 8"d x 24"h x 36"w with dual doors mounted in the chlorination room.
- necessary tubing, hoses, clamps, gate valves, y-strainers, pressure gauges and corporation cocks
- 1 plastic pint size squeeze bottle filled with ammonia solution.
- 1 cylinder wrench.

- All signage required by the Occupational Safety and Health Administration (OSHA). This shall include at a minimum "Danger-Chlorine Gas" on the entry door of the chlorine room, "Danger-Full Cylinders" above full cylinder storage area and "Caution - Empty Cylinders" above empty cylinder storage area. Signs shall be 14" x 10" in size and made of 0.063" aluminum with a baked enamel finish.

Start Up Service

The Contractor shall furnish a factory-trained service person to inspect the equipment after installation, place it into operation and instruct the operators on its use and maintenance.

Shop Drawings

Five sets of shop drawings of the proposed chlorination system and installation shall be submitted to the ENGINEER for approval prior to ordering the equipment. Seven sets of instruction manuals shall be supplied with the chlorination equipment.

ITEM 15

MONITORING SYSTEM

In the lump sum price bid the CONTRACTOR shall furnish all materials and do all work necessary to install a complete and functioning monitoring system capable of monitoring system operation of components herein specified and retransmitting the various system signals to the City of Elkhart's main terminal located at the North Main Street Well Field pump building.

Work included under this item shall include furnishing and installing a remote terminal unit (RTU) with battery back-up, wiring all monitored system components to the RTU, adding required circuitry and programming to the City of Elkhart's main terminal unit (MTU) and furnishing and installing all equipment necessary to radio signals to and from the RTU to and from the MTU.

For purposes of system responsibility, all of the equipment listed herein shall be furnished by a single supplier, experienced in comparable system requirements. The manufacturer of the control system shall provide five (5) complete sets of wiring diagrams, hydraulic layouts, dimensional prints, bills of material and operation summaries for submittal to the ENGINEER for approval prior to the manufacture of the control system. Five (5) complete instruction manuals containing the above information shall be provided to the Owner at the time the monitoring system is shipped. The selected supplier shall be responsible for the correct operation of the equipment as specified after installation.

The manufacturer shall warrant the monitoring system to be free from any defective material and workmanship for a period of one year from date of installation. The manufacturer shall replace any defective materials or units during this period at no cost to the Owner.

The CONTRACTOR shall obtain the services of a technical representative of the manufacturer to inspect the installation and make any adjustments prior to start up. He shall also instruct operating personnel in the use of the equipment.

The system shall be manufactured by Motorola Corporation to match existing City of Elkhart equipment.

The RTU shall be equipped with a Yagi antenna with lightning and surge suppression devices located in both the antenna and the RTU. The antenna shall be mounted on the peak of the roof of the building.

The monitoring system RTU located in the fire pump room shall provide the following functions:

1. Power loss alarm.
2. Entry alarm.
3. Fire alarm.
4. Chlorinator feed rate.
5. Chlorine cylinder weights.
6. Chlorine leak warning.
7. Chlorine leak alarm.
8. Chlorine residual.
9. Flow rate.
10. Water pressure upstream of the fire pump.
11. Water pressure downstream of the fire pump.
12. Operation status of the fire pump.
13. Communication failure.
14. RTU power failure.

The manufacturer shall be required to modify the existing City of Elkhart database inclusions and IGC computer "view" screens to incorporate the above functions. A list of screens can be obtained from the City of Elkhart. All screen modifications must be performed to the satisfaction of the City of Elkhart.

Shop Drawings

The CONTRACTOR shall submit five (5) copies of the shop drawings of the equipment installed under this item to the ENGINEER for approval. Upon approval of these items, the CONTRACTOR shall supply the ENGINEER seven (7) copies of the operation and maintenance manuals for the equipment.

ITEM 16

ELECTRICAL SYSTEM

For the lump sum price bid the CONTRACTOR shall furnish and install all electrical material and equipment and make all necessary tests to place the equipment in operating order. Electrical materials and equipment to be furnished and installed shall include the electrical work for a new service entrance to feed the power requirements of the facility. This work shall include all fused disconnect switches, safety switches, lighting panelboard lighting fixtures, lamps, motor control centers, as well as all conduits, raceways, wiring, wiring devices, conduit fittings, receptacles, light switches, and other appurtenances necessary to complete the electrical installation, ready for operation as shown and noted on the plans and as specified, unless specifically included under other contract items.

Rules, Standards and Permits: The entire electrical installation when completed by the CONTRACTOR shall comply with the requirements of the National Electrical Code, and all state and municipal regulations applicable, as well as all reasonable regulations of the power company furnishing the service. All necessary permits and inspections required shall be obtained and paid for by the CONTRACTOR. The installation and all material used therein shall also be in accordance with the current Standards of the National Board of Fire underwriters and the National Electrical Manufacturer's Association, insofar as they are applicable and not in conflict with these specifications.

General: It is the intent of these specifications that all the electrical equipment shall be of high grade and modern design, and that the entire electrical system shall be complete with distribution panel, safety switches, all conduit, wiring, fittings, equipment, lighting fixtures, lamps and all appurtenances. The CONTRACTOR shall, under the contract price, furnish and pay for all material, labor, permanent, temporary and incidental work; and all appurtenances, and do everything which may be necessary to carry out the contract in good faith, which contemplates everything completed, of suitable material, properly constructed and finished, all connections made, and all specified tests made. The CONTRACTOR shall place all equipment in operation and shall, at his own expense, make all adjustments, connections, additions and changes necessary for successful and satisfactory operation.

Electrical system layouts indicated on drawings are diagrammatic and locations of outlets and equipment are approximate; exact routing of cables and wiring, locations of outlets and equipment shall be governed by structural conditions and obstructions. Equipment requiring maintenance and operation shall be located and installed so it will be readily accessible. The right is reserved to make any reasonable change in locations of outlets and equipment prior to roughing-in without involving additional expense.

The CONTRACTOR shall note that certain electrical devices, materials, equipment and work are specified in other sections of these specifications, such as motors, certain

control devices and electric wiring associated with these control devices. It is the CONTRACTOR's responsibility to coordinate the requirements of the entire plans and specifications in such a manner as to result in the complete electrical installation, regardless of any minor variations or discrepancies between the various sections of the documents.

Except in those instance where definite sizes of motors are specified, the sizes as indicated on the plans are approximate only. Final sizes shall be determined from the actual equipment purchased, and the breakers, starters, conduit and wire must be supplied at no extra compensation for the motor size actually installed.

Shop Drawings: The CONTRACTOR shall furnish five sets of complete and detailed, working drawings of the motor control centers, all electrical equipment, conduit and wire runs and connections, to the ENGINEERS for approval before proceeding with the installation. Such approval shall not relieve the CONTRACTOR from the necessity of or the expense involved in the correction of any errors that may exist in the drawings or the satisfactory operation of the apparatus or the equipment.

Standards of Workmanship and Materials: All materials shall be new and shall conform with the standards of the Underwriter's Laboratories, Inc., in every case where such standards have been established. All work shall be executed in a workmanlike manner and shall present a neat mechanical appearance when completed.

Inspection of Site: Before submitting his proposal, each bidder shall personally inspect the site of the proposed work in order to arrive at a clear understanding of all factors which may affect the execution of the work under this contract.

Circuit Directories: CONTRACTOR shall neatly identify all circuits connected by him on a typewritten directory card permanently attached to the cover or door of the circuit breaker panel-board. Units in the motor control center shall be individually identified by means of engraved bakelite nameplates.

Temporary Electrical Service: During the construction the CONTRACTOR shall furnish, install, and maintain in proper operating condition a temporary electrical service of adequate capacity to provide power and lighting for the use of all the trades. The temporary service shall be available until all work has been completed and approved.

Grounding: The CONTRACTOR shall furnish all material and labor required to test the common grounding system so that it meets the requirements of the National Electrical Code (26 Ohms maximum resistance to ground). The CONTRACTOR shall connect, with approved fittings, the grounding bus in the Motor Control Centers to the common system ground.

The entire power distribution system including conduits, outlets, junction boxes, pull boxes switch housings and motor starters housing, motor frames, etc., shall be so installed that it will constitute sufficient ground connections. This will be accomplished by drawing up conduit connections tight, by the use of grounding lugs with bonding wires, and by bonding motor frames to rigid conduit system.

Conduit Work: Unless otherwise specified, all wiring shall be in rigid steel conduits. All conduits shall be standard sizes and shall conform to the National Electric Code and shall not vary over 5% below or above standard weights. Steel conduits shall be hot galvanized, and if dipped, shall be wiped inside and outside, including threads and couplings. The interior of the conduit shall have a coat of enamel or lacquer baked on. As far as practicable, all conduit work shall be concealed. Where exposed, conduits shall run parallel to and at right angles to walls and plumb on walls. Right angle turn in conduits 1¼ inches and larger shall be made with shop fabricated elbows with a minimum radius of 7 diameters. No conduit for power wiring shall be less than 3/4" and for lighting and control wiring ½".

Fittings, boxes and supports shall be hot galvanized. Steel junction boxes and pull boxes used indoors shall be made of one piece of sheet steel, overlapped and welded or riveted at the corners. Outdoor boxes for steel conduit shall be cast iron with clamped covers. The use of sectional boxes will not be permitted.

Conduits in floor slabs shall run above the bottom reinforcing steel and be covered with at least 2 inches of concrete. Aluminum conduit fittings and boxes, if permitted by the Engineer, shall not be embedded in concrete.

Unless otherwise shown in drawings, all electrical conduit installed outdoors, underground, shall be in accordance with the NEC. Burial depth shall be 18 inches, except that where buried under driveways, the minimum depth shall be 36 inches. Conduits shall be placed in trench which shall be graded true and be free from stones and soft spots. If more than one conduit is placed in a trench, plastic separators shall be used.

All conduits installed outdoors exposed or concealed in walls and in concrete, as well as all conduit installed indoors, concealed in walls, ceiling, in concrete or underground, shall be rigid heavy wall galvanized steel.

All conduit installed exposed indoors may be rigid, galvanized steel, electrical metallic tubing above switch height and rigid, heavy wall, galvanized steel below switch height.

Lightning Protection: All motors installed out of doors shall be protected from voltage stress due to lightning by the use of lightning arresters specially designed for the protection of AC rotating machinery.

Wire: All interior power wiring shall have Type RH "heat resistant grade rubber" insulation, suitable for operation at a conductor temperature of 75° Centigrade. All interior lighting and control wiring shall have Type TW thermoplastic insulation suitable for operation at a conductor temperature of 60° C or 75° C respectively.

All wire and cable for use on circuits of 480 volts or less shall be insulated for not less than 600 volts. For use on voltage higher than 480 volts, they shall be insulated for not less than the minimum voltages as recommended by the A.I.E.E.

All conductors #6 A.W.G. and larger shall be stranded; sizes less than #6 shall be solid, unless otherwise specified. Minimum power wiring size shall be # 12; minimum lighting and control wiring size shall be # 14 unless otherwise designed.

All wiring devices shall be specification grade with duplex outlets of the ground type.

Openings in Floor, Walls and Foundations: The CONTRACTORS shall arrange for the necessary openings or spaces in the work for the conduits, wires, or other equipment, and on failure to so provide shall do such cutting and patching as may be necessary.

Cabinets and Control Centers: Panelboards, control centers, starters, circuit breakers and all other items of equipment must be of first class construction and must be guaranteed for the service required. Unless otherwise designated, equipment manufactured by Square D Company, Allen-Bradley Company, Westinghouse Electric Company, Cutler-Hammer Company, General Electric Company or equal shall be supplied. Where possible all equipment shall be supplied by a single manufacturer for uniformity.

Circuit Protection: The CONTRACTOR shall furnish and install proper and adequate fuses, circuit breaker trips, heaters and overload relays in all safety switches, circuit breakers and starters where called for on the plans, as specified, or as required for the overcurrent protection of the several circuits.

Enclosures: The CONTRACTOR shall furnish enclosures suitable for the area in which they are being installed. All interior and exterior controls shall be NEMA.

Circuit Breaker Lighting Panelboards: Panelboards shall be of the dead-front safety type, equipped with thermal-magnetic molded case circuit breakers with frame, trip ratings and number of poles as shown on the schedule.

Breakers shall be quick-make, quick-break, indicating and have common trip in all multiple breakers. Trip indication shall be clearly shown by the breaker handle taking position between ON and OFF when tripped. Connections to the panelboard bars shall be bolt on.

Bus bar connections to the branch circuit breakers shall be of the "distributed phase" or "phase sequence" type. Single phase, three-wire panel board bussing shall be such that any two adjacent single-pole breakers are connected to opposite polarities in such a manner that two-pole breakers can be installed in any location. All current-carrying parts of the bus assembly shall be plated. Terminals for branch circuit wiring and for feeder and neutral conductors shall be UL listed as suitable for the type of conductors specified.

Panelboard circuit numbering shall be arranged in such a way that starting at the top, odd numbers shall be used in sequence down the left-hand side and even numbers shall be used in sequence down the right-hand side. A circuit directory from and card with a clear plastic covering shall be provided on the inside of the door of each panelboard.

Minimum circuit breaker short-circuit interrupting capacity shall be 7,500 amperes, asymmetrical.

Panelboards shall be provided in the location shown on the plans with the circuits and blanks as indicated.

Circuit Breakers Selection: Circuit breaker for all circuits, motors and other equipment shall be selected in types and ratings in accordance with the National Electrical Code to provide a coordinated system of over current protection so that, in case of a fault or overload, only the fuses nearest the fault or overload equipment shall open.

Wiring Devices:

1. Switches:
Single Pole - Hubbel # 1221
Double Pole - Hubbel # 1222
2. Receptacles: Grounding Type
15A, 2P, 3 wire, 125 V, Duplex Hubbell # 5362
Ground fault 15A, 3 wire, 125 V, Hubbell # GF-5362

Plates: Device plates of one (1) piece type shall be provided for all outlets and fittings to suit the device installed. Plates on unfinished walls and on fittings shall be of zinc coated sheet steel or cast metal having rounded or beveled edges. Plates on finished walls shall be Ivory plastic. Screws shall be countersunk heads in a color to match the plate finish.

Fixture: Fixtures on drawings as indicated shall be installed by the electrical contractor.

Fire Alarm: A smoke detector shall be installed in the fire pump room and the chlorination room. The smoke detectors shall be wired directly to the electric panel with a battery

backup power supply and shall give an audible signal and a 4-20 ma signal to the remote terminal unit.

Entry Alarm: An entry alarm shall be installed on each door and each roof window which is capable of detecting door/window opening and glass breakage. The alarm system shall have a light and horn mounted at the peak of the gable end of the building. The alarm system shall also be wired to the remote terminal unit for remote monitoring of the entry condition. A keyed on/off switch shall be located outside of the main entry door so that the alarm may be turned off by maintenance or fire department personnel.

ITEM 17

CONSTRUCTION FIELD OFFICE

For the lump sum bid the CONTRACTOR shall provide complete and in place a field office for the ENGINEER's sole use that shall be erected or placed upon the construction site within 10 days after issuance of notice to proceed. The office shall be removed no later than 10 days after the effective date of final acceptance of the work. The office shall meet the following minimum requirements:

1. Dimensions shall be at least eight feet wide and eight feet high (floor to ceiling), with no less than 300 square feet of floor area.
2. There shall be at least two hinged or sliding windows, both in working order.
3. There shall be at least one exterior door capable of being locked.
4. Floor, walls, and weatherproof roof shall provide a dustproof, waterproof and wind-tight enclosure.
5. All windows shall be furnished with full-size screens.
6. Lighting, heating and air conditioning equipment shall be furnished, adequately rated and in good working order so as to provide a comfortable, well-lighted work area. At least two duplex 110 volt electric outlets shall be provided.
7. The office shall contain one office desk, nominally 30 inches by 60 inches, with two desk chairs; one counter-top drawing board, nominally 42 inches by 96 inches, with a bar stool; and one storage cabinet with at least two shelves.
8. Functioning sanitary facilities shall be provided, including toilet.
9. Private telephone service shall be provided; all charges for installation and local monthly basic service shall be paid by CONTRACTOR. ENGINEER will pay for all out going calls not covered by the monthly service fee.

ITEM 18

TREE REMOVAL

For the unit price bid the CONTRACTOR shall provide all labor material and equipment for removing trees where called for on the plans or as directed by the ENGINEER or his representatives in the field. This work shall include but may not be limited to cutting such trees, removal and clean up of all associated debris, removing all stumps and roots from the ground or chipping the stumps and properly disposing of the material. Tree removal shall be avoided if possible. Where removal of a stump may result in damage to existing utilities, the stump shall be removed by chipping to a depth of at least one foot below the finished ground surface. Other stumps may be removed by chipping when approved by the ENGINEER.

The diameter of trees to be removed will be measured at a height of 24 inches above the ground and categorized as follow:

<u>Size of Trees</u>	<u>Pay Item</u>	<u>Unit</u>
4" to 8"	Tree Removal, 6"	Each
over 8" to 12"	Tree Removal, 10"	Each
over 12" to 24"	Tree Removal, 18"	Each
over 24" to 36"	Tree Removal, 30"	Each
over 36" to 60"	Tree Removal, 48"	Each

ITEM 19

TREE REPLACEMENT

For the unit price bid the CONTRACTOR shall provide all labor, materials, tools and equipment necessary for furnishing and installing in place 2" caliper trees in accordance with the standards specified below.

The CONTRACTOR shall supply and plant only trees that meet the standards set forth in the current edition of American Standards for Nursery Stock, and be free of disease and insects. All trees shall be grown within Zones 5. All trees shall be free of branches to a point not to exceed 60% of actual height. Trunks shall be straight and true. Shade trees shall be with one central leader without forking.

Measurements shall be based on the following criteria: All trees are to be calipered six inches above the ground and are to be minimum 2" in caliper, balled and burlapped.

All trees shall be placed outside of the right of way as determined by the property owners in the field, with the property owners written permission and right of entry to front lawns. Only property owners who had trees removed shall have trees replaced. Trees shall be replaced at twice the number of trees that were removed. All trees shall be wrapped with a standard 4" tree wrap starting from the base of the tree up to the lowest branch. Wrap shall be secured with jute twine.

Planting Specification:

Pits dug shall be a minimum of 12 inches larger in diameter than the diameter of the root ball.

Plants shall be planted no deeper than previously grown with due allowance to settling.

Set tree in planting pit, then backfill with existing soil. If material is not suitable in the opinion of the ENGINEER, the CONTRACTOR shall be responsible for supplying at no additional cost, suitable backfill. Trees shall be thoroughly watered as backfilling progresses.

The CONTRACTOR shall notify the ENGINEER who the supplying nurseries for the Contract will be. It shall be the prerogative of the ENGINEER or his representative, to personally inspect all trees to be planted under the Contract if he or his representative deems such inspection necessary.

Hardwood double-shredded bark mulch shall be installed 2 inches thick around base of tree to form a circle of diameter 4 feet.

The tree shall be warranted for a period of one (3) years from date of final acceptance against defects, including death and unsatisfactory growth, except for defects resulting from neglect by owner, abuse or damage by others, or other unusual phenomena or incidents which are beyond the CONTRACTOR's control.

Should the CONTRACTOR fail to comply with any or all of the specifications herein specified concerning the handling and planting of said trees at the time of original planting, the CONTRACTOR shall be responsible for the replacement and replanting of the trees.

Type of trees to be planted.

Green Ash Saplings of 2" caliper measured 6" above grade.

ITEM 20

CONSTRUCTION STAKING

For the unit price bid the CONTRACTOR shall provide construction lay-out/surveying for improvements as shown in the project plans and specifications. The bid price shall include, but may not be limited to the following;

1. Locate existing benchmarks and run level circuit to check elevations. Set new benchmarks (if needed) every 500 feet. (Benchmark data sheets shall be provided to the CONTRACTOR and the ENGINEER)
2. Location and grade, (with 2 off-set stakes) including cut sheets as required. (Cut sheets must be provided to the ENGINEER).
3. Stake Right of Way as needed.
4. Stake all easement lines.
5. Preserve and perpetuate existing property corners, which are at risk from construction operations. (This item must be performed under the direct supervision of a licensed surveyor).
6. Accurate "As built" of the project must be provided to the ENGINEER upon completion of the project.

The above items will be the minimum requirements and shall be done under the direction of a Land Surveyor or Civil Engineer licensed in the State of Indiana.

PART 7

CONTRACT

THIS CONTRACT made the _____ day of _____, 19____, by and between _____ hereinafter called the "Contractor", and Consolidated Rail Corporation, hereinafter called the "Owner".

WITNESSETH, THAT the Contractor and the Owner for the consideration stated herein agree as follows:

ARTICLE I - SCOPE OF WORK

The Contractor shall perform everything to be performed and shall provide and furnish all of the labor, materials, necessary tools, expendable equipment, and all utility and transportation services required to perform and complete in a workmanlike manner all the work required for the construction of in connection with the Conrail-Elkhart Yard Municipal Water Main Extension project of the Owner all in strict accordance with the Plans and Specifications, including any and all addenda, prepared by Wightman Petrie, Inc., acting and in these contract documents referred to as the Engineer and/or Engineers, which plans and specifications are made a part of this contract, and in strict compliance with the Contractor's proposal and other contract documents herein mentioned which are a part of this contract; and the Contractor shall do everything required by this contract and the other documents constituting a part hereof.

ARTICLE II - COMPENSATION TO BE PAID TO THE CONTRACTOR

In consideration of the completion of the work described herein and in fulfillment of all stipulations of this contract to the satisfaction and acceptance of the Engineers and the Owner, the Owner shall pay and the said Contractor further agrees to receive and accept payment based on the prices bid per unit for material and labor as set forth in the conformed copy of the Contractor's proposal (or bid) hereto attached, which prices shall agree with those in the accepted Contractor's proposal (or bid) as filed with the Owner on the _____ day of _____, 1993, as full compensation for furnishing all the equipment and materials, and for the costs of all premiums on insurance and bonds and for doing all the work contemplated and specified in this contract; also for all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same; and for all risks of every description connected with the work; and for well and faithfully completing the work and the whole thereof, in full compliance with the Plans and Specifications and the requirements of the Engineer under them.

Payments are to be made to the Contractor in accordance with and subject to the provisions embodied in the contract documents hereto attached.

ARTICLE III - COMPONENT PARTS OF THIS CONTRACT

This contract consists of the following component parts, all of which are as fully a part of this contract as if herein set out verbatim, or, if not attached, as if hereto attached.

1. General Conditions
2. Advertisement for Bids
3. Instructions to Bidders
4. Specifications, including Addenda Nos. _____
5. Plans
6. Contractor's Proposal (or Bid)
7. Contract (this document)

In the event that any provision in any of the above component parts of this contract conflicts with any provision in any other of the component parts, the provision in the component part first enumerated above shall govern over any other component part which follows it numerically, except as may be otherwise specifically stated.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be executed in three original counterparts the day and year first above written.

(SEAL) _____
Contractor

Attest: _____

By: _____

Title
(SEAL)

Owner

Attest: _____

By _____

Title

INSTRUCTIONS FOR EXECUTING CONTRACT

If the Contractor be a corporation, the following certificate should be executed:

I, _____, certify that I am the _____ Secretary of the Corporation named as Contractor herein above; that _____ who signed the foregoing contract on behalf of the Contractor was then _____ of said Corporation; that said contract was duly signed for and in behalf of said Corporation by authority of its governing body, and is within the scope of its corporate powers.

If the contract be signed by the secretary of the corporation, the above certificate should be executed by some other officer of the corporation, under the corporate seal. In lieu of the foregoing certificate there may be attached to the contract copies of so much of the records of the corporation as will show the official character and authority of the officers signing, duly certified by the secretary or assistant secretary under the corporate seal to be true copies.

The full name and business address of the Contractor should be inserted and the contract should be signed with his official signature. Please have the name of the signing party or parties typewritten or printed under all signatures of the contract.

If the Contractor should be operating as a partnership, each partner should sign the contract. If the contract be not signed by each partner, there should be attached to the contract a duly authenticated power of attorney evidencing the signer's (signers') authority to sign such contract for and in behalf of the partnership.

If the Contractor be an individual, the trade name (if the Contractor be operating under a trade name) should be indicated in the contract and the contract should be signed by such individual. If signed by one other than the Contractor, there should be attached to the contract a duly authenticated power of attorney evidencing the signer's authority to execute such contract for and in behalf of the Contractor.

PART 8

PROPOSAL

CONSOLIDATED RAIL CORPORATION

CONRAIL-ELKHART YARD MUNICIPAL WATER MAIN

AND GROUNDWATER EXTRACTION SYSTEM FORCE MAIN

TO THE OWNER Consolidated Rail Corporation
2001 Market St. 3C
Philadelphia, PA 19101-1403

Gentlemen:

The undersigned, having familiarized himself with the local conditions affecting the cost of the work, and with the contract documents, including the Advertisement for Bids, Instructions to Bidders, General Conditions, Plans, General Specifications, Project Specifications, Contract, Proposal, Performance Bond, and Addenda and exhibits issued and attached to the specifications on file in the office of the Engineer, hereby propose to perform everything required to be performed and to provide and furnish all of the labor, materials, necessary tools, expendable equipment, and all utility and transportation services necessary to perform and complete in a workmanlike manner all work required for the construction and completion of this project for the Owner, all in accordance with the above, including Addenda Nos. _____, issued thereto, for the prices, to wit:

(the proposal section follows)

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CONSOLIDATED RAIL CORPORATION
ELKHART-YARD MUNICIPAL WATER MAIN EXTENSION
& EXTRACTION SYSTEM FORCE MAIN

ITEM NO.	ESTIMATED QUANTITY	UNIT	DESCRIPTION	PRICE (WORDS) UNIT PRICE OR LUMP SUM PRICE	UNIT PRICE (figures)	TOTAL
1.1	530	LFT	6" D.I. WATER MAIN			
1.2	32,590	LFT	8" D.I. WATER MAIN			
1.3	7,470	LFT	10" D.I. WATER MAIN			
1.4	2,780	LFT	12" D.I. WATER MAIN			
1.5	26,880	LFT	16" D.I. WATER MAIN			
2.1	4,310	LFT	6" D.I. FORCE MAIN			
2.2	11,885	LFT	8" D.I. FORCE MAIN			
2.3	2,155	LFT	12" D.I. FORCE MAIN			
2.4	5	EA	MANHOLE WITH AIR RELEASE VALVES			
3	63,417	LBS	D.I. FITTINGS			
4.1	6	EA	6" GATE VALVE & BOX			
4.2	71	EA	8" GATE VALVE & BOX .			
4.3	7	EA	10" GATE VALVE & BOX			
4.4	16	EA	12" GATE VALVE & BOX			

CONSOLIDATED RAIL CORPORATION
ELKHART-YARD MUNICIPAL WATER MAIN EXTENSION
& EXTRACTION SYSTEM FORCE MAIN

ITEM NO.	ESTIMATED QUANTITY	UNIT	DESCRIPTION	PRICE (WORDS) UNIT PRICE OR LUMP SUM PRICE	UNIT PRICE (Figures)	TOTAL
4.5	31	EA	16" BUTTERFLY VALVE & BOX			
5.1	58	EA	FIRE HYDRANT ASSEMBLY- ELKHART COUNTY			
5.2	29	EA	FIRE HYDRANT ASSEMBLY - ST. JOSEPH COUNTY			
6.1	12,545	SYD	BITUMINOUS ROAD REST. TYPE A			
6.2	22,685	SYD	BITUMINOUS ROAD REST. TYPE B			
7	995	SYD	BITUMINOUS DRIVE RESTORATION			
8	1,600	SYD	CONCRETE DRIVE RESTORATION			
9.1	45	LFT	6" BORE & JACK			
9.2	1,035	LFT	8" BORE & JACK			
9.3	285	LFT	12" BORE & JACK			
9.4	460	LFT	16" BORE & JACK			
10	482	EA	WATER WELL ABANDONMENT			

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CONSOLIDATED . .IL CORPORATION
ELKHART-YARD MUNICIPAL WATER MAIN EXTENSION
& EXTRACTION SYSTEM FORCE MAIN

ITEM NO.	ESTIMATED QUANTITY	UNIT	DESCRIPTION	PRICE (WORDS) UNIT PRICE OR LUMP SUME PRICE	UNIT PRICE (Figures)	TOTAL
11	482	EA	WATER SERVICE CONNECTIONS			
12	1	LSUM	FIRE PUMP BUILDING			
13	1	LSUM	FIRE PUMP & APPURTENANCES			
14	1	LSUM	CHLORINATION SYSTEM			
15	1	LSUM	MONITORING SYSTEM			
16	1	LSUM	ELECTRICAL SYSTEM			
17	1	LSUM	CONSTRUCTION FIELD OFFICE			
18.1	75	EA	TREE REMOVAL, 6"			
18.2	121	EA	TREE REMOVAL, 12"			
18.3	51	EA	TREE REMOVAL, 18"			
18.4	129	EA	TREE REMOVAL, 30"			
18.5	3	EA	TREE REMOVAL, 48"			
19	758	EA	TREE REPLACEMENT			
20	1	LSUM	CONSTRUCTION STAKING			

TOTAL BID ENTERED

\$ _____

In submitting this bid, it is understood that the right is reserved for the Owner to reject any and all bids. It is agreed that this bid may not be withdrawn for a period of thirty (30) days from the opening thereof.

If awarded a contract, the undersigned agrees to begin work within _____ days of the effective date of contract and further agrees to proceed with all possible dispatch, and fully complete all the work ready within _____ consecutive calendar days of the effective date of contract.

Date _____, 19__

FIRM NAME _____

OFFICIAL ADDRESS

BY _____

Note: Bidders should not add any conditions or qualifying statements to the bid as otherwise the bid may be declared irregular as being not responsive to the Advertisement for Bids.)

NON-COLLUSION AFFIDAVIT

STATE OF _____ SS.
COUNTY OF _____

The undersigned bidder or agent, being duly sworn, on oath says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting, nor to prevent any person from bidding nor to induce anyone to refrain from bidding and that this bid is made without reference to any other bid and without any agreement, understanding, or combination with any other person in reference to such bidding in any way or manner whatever.

Bidder or Agent

For _____
Firm or Corporation

Subscribed and sworn to before me this _____ day of _____, 19____.

My Commission Expires:

Notary Public

PART 9

PERFORMANCE BOND

INSTRUCTIONS FOR EXECUTION OF PERFORMANCE BOND

The penal amount of the Performance Bond for a unit price contract shall be the summation of the correct and checked extension of the unit prices with the estimated number of units.

The form of bond attached hereto shall be used for each contract. This form contemplates one corporate surety only. In case co-sureties will be furnished, proper forms therefore shall be obtained.

If the principal is an individual, his full legal name and residence shall be inserted in the body thereof, and he shall sign the bond with his usual signature in the line opposite the scroll seal

If the principals are partners, their individual names shall appear in the body of the bond, with the recital that they are partners composing a firm, naming it.

If the principal is a corporation, the name of the State in which incorporated shall be inserted in the appropriate place in the body of the bond, and said instrument shall be executed and attested under the corporate seal, the face shall be stated, in which case a scroll or adhesive seal shall appear following the corporate name. This also applies to execution by the surety.

The date of the bond must not be prior to the date of the contract for which it is given.

A power of attorney authorizing the execution of the Bond by an attorney-in-fact, or agent, shall be attached to the executed counterpart of the bond. If the bond is executed by an out-of-state agent, the executed counterpart of the bond shall be countersigned by a licensed resident agent.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____,
as principal, and the _____,
a corporation and authorized to transact business in the State of _____ as
surety, are held and firmly bound unto the _____ as obligers, in the penal
sum of _____ Dollars (\$ _____) lawful money of the United States
of America, for the payment of which, well and truly to be made, we bind ourselves, our
heirs, executors, administrators, successors and assigns, jointly and severally, firmly by
these presents.

SIGNED, sealed and dated this _____ day of _____ A.D., 199____.

WHEREAS, the above bounden Principal entered into a certain written contract with
the above named obligee, dated the _____ day of _____ A.D.,
19_____ for the construction of _____

(description of work)

which contract is hereby referred to and made a part hereof as fully and to the same
extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that
if the above bounden principal shall well and truly keep, do and perform, each and every,
all and singular the matters and things in said contract set forth and specified to be by
the said Principal kept, done and performed at the time and in the manner in said
contract specified, and shall pay over, make good and reimburse to the above named
Obligees, all loss and damage which said Obligees may sustain by reason of failure or
default on the part of said Principal, then this obligation shall be void; otherwise, to be
and remain in full force and effect.

Witness:

By _____
Attorney-in-Fact

LABOR AND MATERIAL BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____

_____ of the _____ and State of _____, as principal,
and the _____ as surety, are held and firmly
bound unto the _____ as obliges, in the Sum of
_____ Dollars (\$) lawful money of the United States of America, for
the payment of which, well and truly to be made, we bind ourselves, our heirs,
executors, administrators, successors and assigns, jointly and severally, firmly by these
presents.

SEALED WITH OUR SEALS, and dated this _____ day of _____ A.D.,
19____.

WHEREAS, the above bounden Principal entered into a certain written contract with
the above named obligee, dated the _____ day of _____ A.D., 19____
for _____

(description of work)

which contract shall be deemed a part hereof as if set out herein.

AND WHEREAS, this bond is given in compliance with and subject to the provisions of
Act No. 213 of the Public Acts of Michigan, for the year 1963.

NOW, THE CONDITION OF THIS OBLIGATION IS SUCH THAT, if the said
_____ Contractor, shall make payment as the same
may become due and payable of all indebtedness which may arise from said Contractor
to a subcontractor or party performing labor or furnishing materials or supplies or any
subcontractor to any person, firm, or corporation on account of labor performed or
materials or supplies furnished, in the erection, repairing or ornamentation of such
building improvement or works, then this obligation shall be void, otherwise the same
shall be in full force and effect.

ATTEST:

Agent

Principal

SEAL

By

Attorney-in-Fact

H-3

2.2 TECHNICAL ANALYSIS

2.2.1 Fire Pump and Chlorination System

The following analyses were performed in the fire pump station and chlorination system design. These analysis included: a fire hydrant flow test at the corner of West Franklin Street and Nappanee Street; reviewing flows and pressures to determine the fire pump operating point; and estimating the chlorine demand for various flow rates.

2.2.1.1 Fire Pump Requirements

The fire hydrant flow test was performed on September 23, 1993. A static pressure of 65 psi and a residual pressure of 60 psi at a flow of 1,265 gpm was measured. The maximum flow available at a minimum pressure of 20 psi was estimated at 3,800 gpm. This flow is approximately 19% higher than the estimated maximum demand flow of 3,200 gpm. The fire hydrant test confirmed that the maximum demand flow could be provided in the LaRue Street area as indicated in the Kentucky Pipe Model results.

The flow rates and pressures obtained from the Kentucky Pipe Computer Model were utilized to estimate the optimum operating point for the fire pump. A maximum flow of 3,200 gpm, which includes a fire demand of 2,000 gpm, was found to be required downstream of the fire pump. During a fire flow condition, the suction pressure at the fire pump station was estimated to be 30 psi. An estimated differential pressure of 45 psi is required to maintain a minimum pressure of 30 psi at the fire demand location at the intersection of State Road 219 and County Road 16. This allows a 20% factor of safety for maintaining the 30 psi pressure. Fire pumps are required to operate at 150% of their rated flow at 65% of their rated head. Therefore the fire pump specified for the project rated at 2,500 gpm at a 60 psi differential pressure will be capable of pumping up to 3,750 gpm at a minimum pressure differential of 41 psi.

2.2.1.2 Chlorination System Requirements

The chlorine demand at the fire pump station required to maintain a minimum chlorine residual of 0.2 milligrams per liter (mg/l) was estimated to be 0.2 mg/l. This equates to a maximum chlorine demand of 7.6 pounds per day (ppd) at the maximum 3,200 gpm flow rate. Chlorine demands of 2.8 and 1.4 ppd were estimated for the maximum daily flow of 1,200 gpm and an average daily flow of 600 gpm, respectively. Both of these flow rates do not include a fire demand. A 10 ppd chlorinator which is capable of metering each of the estimated chlorine demands was specified for the project.

2.2.2 Proposed Users

The following listing includes the owner's name and address of parcels identified to receive municipal water service as a part of this project. This list was developed utilizing parcel tax code numbers which were taken from the latest County Auditors mapping for the project areas.

C.R. 1 AREA

5-10-405-007	Adams, Joan E. 30313 Blaine Ave. Elkhart, IN 46516
5-10-452-013	Allison, William C. 56783 Southgate Elkhart, IN 46516
5-15-201-010	Anderson, James 30319 U.S. 33 Elkhart, IN 46516
5-15-201-011	Anderson, James 30319 U.S. 33 Elkhart, IN 46516
5-10-477-026	Anderson, John R. 30063 Tower Rd. Elkhart, IN 46516
5-15-226-002	Arnold, Sandra L. P.O. Box 133 Osceola, IN 46561
5-10-453-003	Bair, E. Paula 56804 Southgate Elkhart, IN 46516
5-10-427-017	Baker, Dixie Joan 30129 Wolf Ave. Elkhart, IN 46516
5-10-428-004	Barbour, Linda G. 30188 Wolf Ave. Elkhart, IN 46516
5-15-226-010	Baugo Township Fire Dept. 30065 U.S. 33 Elkhart, IN 46516
5-10-452-008	Bice, Donald 60079 Pembroke Ln. Elkhart, IN 46517
5-10-477-014	Bice, Donald & Dale 60079 Pembroke Ln. Elkhart, IN 46517

5-10-404-013	Bowe, Clyde 30329 Blaine Ave. Elkhart, IN 46516
5-10-476-023	Bradberry, Stanford 30211 Tower Rd. Elkhart, IN 46516
5-10-476-024	Bradberry, Stanford 30211 Tower Rd. Elkhart, IN 46516
5-10-429-012	Briner, Douglas C. 30069 Wolf Ave. Elkhart, IN 46516
5-10-477-017	Brown, Anthony 56791 C.R. 1 Elkhart, IN 46516
5-10-427-015	Brown, Audie L. 30187 W. Wolf Ave. Elkhart, IN 46516
5-10-452-002	Brown, Randy 56784 Burbank Street Elkhart, IN 46516
5-10-451-009	Buel, Robert W. 56934 Burbank Street Elkhart, IN 46516
5-10-452-010	Buel, Robert W. 56934 Burbank Street Elkhart, IN 46516
5-15-201-014	Carter, Floyd K. 51708 S.R. 19 Elkhart, IN 46514
5-10-452-005	Clark, Diana 56842 Burbank Street Elkhart, IN 46516
5-11-351-006	Clay, Glenn 56880 C.R. 1 Elkhart, IN 46516
5-10-452-023	Correll, Ward L. 26314 Quail Ridge Elkhart, IN 46514

5-15-226-009	Defreese, Louis J. 30632 N. Shore Dr. Elkhart, IN 46514
5-10-451-010	Dixon, Robert 30377 Tower Road Elkhart, IN 46516
5-10-452-003	Dolan, Joseph W. 56804 Burbank St. Elkhart, IN 4651w6
5-15-201-002	Eash, Inez L. 301 E. Adams St. Osceola, IN 46561
5-15-201-009	Everett, William 30331 U.S. 33 Elkhart, IN 46516
5-15-201-001	Fackert, Alice A. Trustee of 57066 Tower Rd. Elkhart, IN 46516
5-10-477-022	Fiedler, Jack L. Rt. #3 Box 174 Old Town, FL 32680
5-10-405-006	Fisher, Linda 30329 Blaine Ave. Elkhart, IN 46516
5-10-477-028	Fitch, Michael P. 56861 C.R. 1 Elkhart, IN 46516
5-10-451-005	Flager, Barry Sr. 56841 Burbank Street Elkhart, IN 46516
5-15-226-012	Germann, Perry J. 30076 Tower Rd. Elkhart, IN 46516
5-10-405-004	Gletty, Larry D. 30250 Wolf Ave. Elkhart, IN 46516
5-10-428-007	Goff, Shirley 30229 Blaine Avenue Elkhart, IN 46516

5-15-226-007	Goldsburg, James R. 30066 Tower Rd. Elkhart, IN 46516
5-10-451-002	Grames, Gary W. 56783 Burbank Street Elkhart, IN 46516
5-10-477-018	Grose, Laverna J. 57265 C.R. 13 Elkhart, IN 46516
5-10-452-001	Gunn, Ira Neal 56764 Burbank Elkhart, IN 46516
5-10-477-020	Hahn, Lloyd R. 56889 C.R. 1 Elkhart, IN 46516
5-10-403-005	Haines, George R. 56725 Burbank Ave. Elkhart, IN 46516
5-15-201-003	Hancock, Howard 30340 Tower Rd. Elkhart, IN 46516
5-10-428-012	Hart, Gerald L. 30119 Blaine Ave. Elkhart, IN 46516
5-10-429-020	Harter, David W. 30023 Wolf Ave. Elkhart, IN 46516
5-11-351-001	Harter, Edith 56710 C.R. 1 Elkhart, IN 46516
5-15-201-001	Henderson, James 30499 Tower Rd. Elkhart, IN 46516
5-10-427-013	Hendrix, Robert W. 30227 Wolf Ave. Elkhart, IN 46516
5-10-452-012	Hinegardner, Brian K. 1425 Markle Ave. Elkhart, IN 46517

5-10-429-010	Howie, Kevin 30107 Wolf Ave. Elkhart, IN 46516
5-10-405-008	Humphreys, Sharon L. 30289 Blaine Ave. Elkhart, IN 46516
5-15-226-001	Jackson, Rolland D. P.O. Box 73 Osceola, IN 46561
5-10-451-006	Jackson, Ronald D. 56861 Burbank Elkhart, IN 46516
5-10-404-015	Jean, Arthur J. 303 Wolf Ave. Elkhart, IN 46516
5-15-201-004	Jodway, Douglas G. 30328 Tower Rd. Elkhart, IN 46516
5-15-226-004	Johnson, Randell 30130 Tower Rd. Elkhart, IN 46516
5-10-429-011	Jones, Cecil J. 30095 Wolf Ave. Elkhart, IN 46516
5-10-404-014	Jones, Robert I. 30317 Wolf Ave. Elkhart, IN 46516
5-10-453-004	Jordan, Bobby L. 56824 Southgate Elkhart, IN 46516
5-15-201-012	Kelly, Johnny 30291 U.S. 33 Elkhart, IN 46516
5-10-453-001	Kemp, Juanita E. 56764 Southgate Elkhart, IN 46516
5-10-453-002	Kincannon, Roy 56784 Southgate Elkhart, IN 46516

5-10-404-016	Konrath, Albert 30290 Wolf Ave. Elkhart, IN 46516
5-10-405-003	Konrath, Albert Paul 30290 Wolf Ave. Elkhart, IN 46516
5-10-405-005	Lechel, Travis 56734 Burbank Elkhart, IN 46516
5-10-452-016	Lehlang, Bernard 19210 Wedgewood Dr. South Bend, IN 46637
5-10-430-001	Loy, Eugene W. 30076 Wolf Ave. Elkhart, IN 46516
5-10-430-010	Loy, Eugene W. 30076 Wolf Ave. Elkhart, IN 46516
5-10-452-004	Maier, Ronald R. 56824 Burbank St. Elkhart, IN 46516
5-10-427-014	Martin, Peter 30201 Wolf Ave. Elkhart, IN 46516
5-10-405-001	Mason, James A. 30342 Wolf Ave. Elkhart, IN 46516
5-10-452-017	Mason, Richard 56861 Southgate Elkhart, IN 46516
5-10-451-004	McMillan, Steven 56823 Burbank Street Elkhart, IN 46516
5-11-351-004	Meiers, Daniel C. 57877 C.R. 1 Elkhart, 46516
5-11-351-010	Mellinger, Rex L. 56766 C.R. 1 Elkhart, IN 46516

5-15-201-006	Messick, Delmas A. 30296 Tower Rd. Elkhart, IN 46516
5-10-476-025	Michiana R.E. Rentals, Inc. P.O. Box 2062 Elkhart, IN 46515
5-15-226-006	Neumann, Wallace W. 30082 Tower Rd. Elkhart, IN 46516
5-15-201-017	Newman, Billy L. 30278 Tower Rd. Elkhart, IN 46516
5-10-477-015	Newman, M. Vernon 2310 Morton Ave. Elkhart, IN 46517
5-10-451-007	Ohse, R. Brooks 56881 Burbank St. Elkhart, IN 46516
5-15-201-016	Orand, Stella 30256 Tower Rd. Elkhart, IN 46516
5-10-477-023	Peterson, Russell 30063 Tower Rd. Elkhart, IN 46516
5-15-226-013	Pontius, Frank W. 30096 Tower Rd. Elkhart, IN 46516
5-10-430-007	Pontius, Jack E. 30077 Blaine Ave. Elkhart, IN 46516
5-10-430-009	Pontius, Richard 30101 Blaine Ave. Elkhart, IN 46516
5-15-201-005	Qualls, Charles 30314 Tower Rd. Elkhart, IN 46516
5-10-427-016	Quist, Henry A. 30161 Wolf Ave. Elkhart, IN 46516

5-15-226-011	R. & C. Real Estate 30115 U.S. 33 Elkhart, IN 46516
5-10-401-001	Ramsey, Roe 30441 Tower Rd. Elkhart, IN 46516
5-10-452-011	Reynolds, David J. 30335 Tower Rd. Elkhart, IN 46516
5-10-477-012	Rodino, Louis A. 30110 Blain Elkhart, IN 46516
5-15-226-003	Sawyer, Thomas R. 30150 U.S. 33 Elkhart, IN 46516
5-10-453-024	Sherman, Marshall 30253 Tower Rd. Elkhart, IN 46516
5-10-453-005	Shrock, Jerry 56842 Southgate Elkhart, IN 46516
5-15-226-008	Smith, Craig W. P.O. Box 97 Osceola, IN 46561
5-10-428-005	Smoker, Jon P. 30174 Wolf Ave. Elkhart, IN 46516
5-10-405-002	Spry, Willis F. 30312 Wolf Ave. Elkhart, IN 46516
5-10-428-006	Stanford, William T. 30136 Wolf Ave. Elkhart, IN 46516
5-10-452-006	Strickland, Steve 56862 Burbank Street Elkhart, IN 46516
5-10-452-014	Sweeney, Douglas 56803 Southgate Elkhart, IN 46516

5-10-477-031	Trosper, Ronald 56705 C.R. 1 Elkhart, IN 46516
5-10-451-012	Troup, George 17650 Generations Drive South Bend, IN 46630
5-11-351-007	Van Diepenlios, Hessel 56908 C.R. 1 Elkhart, IN 46516
5-10-430-008	Wabash Annual Conf. of Free Methodist 3616 W. 16th St. Indianapolis, IN 46222
5-10-428-003	Waugh, David R. 30204 Wolf Ave. Elkhart, IN 46516
5-10-428-010	Waugh, John B. 30175 Blaine Ave. Elkhart, IN 46516
5-10-428-011	Waugh, John B. 30175 Blaine Ave. Elkhart, IN 46516
5-10-428-008	Waugh, Robert L. 30217 Blaine Ave. Elkhart, IN 46516
5-10-428-001	Webster, Davis K. 30228 Wolf Avenue Elkhart, IN 46516
5-10-428-009	Webster, Davis K. 30197 Blaine Ave. Elkhart, IN 46516
5-10-403-004	White, Richard L. 56709 Burbank Street Elkhart, IN 46516
5-10-404-017	Wireman, Aaron 30249 Wolf Ave. Elkhart, IN 46516
5-10-477-027	Wolford, Earl E. 30015 Tower Rd. Elkhart, IN 46516

5-10-477-016

Yoder, Steve P.
56767 C.R. 1
Elkhart, IN 46516

LARUE STREET AREA

5-12-379-008	Abrell, Clay 28138 US 33 Elkhart, IN 46516
5-12-379-007	Abrell, Clay 28138 US 33 Elkhart, IN 46516
5-12-333-004	Adminstration of Veterans Affairs Washington, D.C. 20204
5-12-412-005	Allen, Bobby Joe
5-12-412-006	56678 Elm Ridge Rd. Elkhart, IN 46516
5-12-406-013	Arnold, Mary A, & Hill, Thomas E.
5-12-406-014	28428 Illinois St. Elkhart, IN 46516
5-12-426-015	Barfell, Kenneth D. 28152 CR 16 Elkhart, IN 46516
5-12-426-015	Barfell, Kenneth 28152 CR 16 Elkhart, IN 46516
5-12-329-005	Barrett Selmer A. 56575 Shore Ave. Elkhart, IN 46516
5-12-405-004	Battler, Thomas E. 753 Violet Rd. Elkhart, IN 46514
5-12-408-025	Blume, Mark A.
5-12-408-026	56693 Upper Parkway Elkhart, IN 46516
5-10-301-008	Bolln, Wade A. c/o Teacher Credit Union P.O.Box 1395 South Bend, IN 46624
5-12-256-002	Bonisolli, Franco & Sally c/o Clindaniel D. 56486 Boss Blvd. Elkhart, IN 46516

5-12-255-007	Bontrager, Bill 22098 CR 10 Elkhart, IN 46514
5-12-408-009	Bottom, Katherine 56670 Boss Blvd. Elkhart, IN 46516
5-12-332-006	Bowen, Sandra K. 56508 Best Ave. Elkhart, IN 46516
5-12-334-006	Bowen, Sandra Kay 56649 Best Ave. Elkhart, IN 46516
5-12-178-002	Breden, Richard 28572 CR 16 Elkhart, IN 46516
5-12-329-007	Breden, Robert 126 A E Wilson St. Realto, CA 92376
5-12-332-003	Bricker, Myrtle Oliver 56526 Shore Ave. Elkhart, IN 46516
5-12-333-005	Bryant, Glenna 28548 Illinois Elkhart, IN 46516
5-12-412-003	Carpenter, Albert 56640 Elm Ridge Rd. Elkhart, IN 46516
5-10-151-002	Chizum, Arthur 56328 Ash Rd. Osceola, IN 46561
5-12-407-015	Ciaravino, Fred 56570 Boss Blvd. Elkhart, IN 46516
5-12-327-001	Clements, Charles 28615 Warren St Elkhart, IN 45616
5-12-327-002	Clements, Charles 28615 Warren St Elkhart, IN 46516

5-12-380-011	Cline, Retha 1407 Locust Ave. Elkhart, IN 46516
5-12-379-003	Cline, Retha 1407 Locust Ave. Elkhart, IN 46516
5-12-401-013	Coleman, Billy B.
5-12-401-014	56529 Fountain Row Elkhart, IN 46516
5-10-151-003	Collins, Carol 56436 Ash Rd. Osceola, IN 46561
5-12-254-007	Comer, Bradley 28368 CR 16 Elkhart, IN 46516
5-12-411-002	Companion, Antony
5-12-411-012	56642 Upper Parkway Elkhart, IN 46516
5-12-330-008	Coti, Bette L. 56606 Old Orchard Ln. Elkhart, IN 46516
5-12-333-008	Cramer, Michael N. & Ehy, Cynthia 56601 Best Ave. Elkhart, IN 46516
5-12-253-011	Creech, Belinda L.
5-12-253-012	56487 Fountain Row Elkhart, IN 46516
5-12-329-004	Davidhizar Ronald E. 203 Middlebury St. Goshen, IN 46526
5-12-255-002	DeBow, George J. 28322 CR 16 Elkhart, IN 46516
5-12-406-003	Deese, Steve
5-12-406-004	1312 E. Beardsley Elkhart, IN 46514

5-12-380-009	Dellinger, Palmer c/o Buck, Richard 56775 Best Ave. Elkhart, IN 46516
5-12-328-007	Demerly, Dewey 56527 Shore Ave. Elkhart IN 46516
5-12-403-014	Detion, Grady M. 56579 Boss Blvd. Elkhart, IN 46516
5-12-333-009	Doland, George A. 56765 Brightwood Blvd. Elkhart, IN 46516
5-12-407-004 5-12-407-005	Dorrier, Doles Jean 56664 Spring Ave. Elkhart, IN 46516
5-12-377-006	Duncan, Ralph 56739 Best Ave. Elkhart, IN 46516
5-12-411-014 5-12-411-015	Edsall, Richard K. 56681 Elm Ridge Rd. Elkhart, IN 46516
5-12-411-016	Edsall, Clarence R. 56620 Elm Ridge Rd. Elkhart, IN 46516
5-12-328-003	Ellsworth, Harold 30313 CR 20 Elkhart, IN 46516
5-10-301-015	Erving, Cynthia 56680 Ash Road Osceola, IN 46561
5-10-351-016	Everett, Kenneth c/o Everett, Wilburn 56806 Ash Road Osceola, IN 46561
5-10-351-017	Everett, Wilburn 56806 Ash Road Osceola, IN 46561

5-10-301-010	Ewing, Cynthia 56680 Ash Road Osceola, IN 46561
5-10-301-016	Finley, Fred 56708 Ash Road Osceola, IN 46561
5-12-377-005	Fletcher, Carl 56721 Best Ave Elkhart, IN 46516
5-12-328-006	Fox, Raymond 56512 Shore Ave. Elkhart, IN 46516
5-12-334-002	Freel, Delbert
5-12-334-003	56652 Shore Ave. Elkhart, IN 46516
5-12-334-008	Freel, Delbert E.
5-12-334-009	56652 Shore Ave Elkhart, IN 46516
5-12-334-011	Freel, Francis V. 56715 Best Ave Elkhart, IN 46516
5-12-426-002	Gehring, James F. 28192 CR 16 Elkhart, IN 46516
5-12-332-007	Gillison, Boone 28521 Illinois Elkhart, IN 46516
5-12-330-009	Gomez, Javier T. 200 Nadel. Elkhart, IN 46516
5-12-406-017	Gordon, Ronald
5-12-406-018	56693 Spring Ave. Elkhart, IN 46516
5-12-406-015	Gorsuch, Richard A.
5-12-406-016	56675 Spring Ave. Elkhart, IN 46516
5-12-401-015	Gross, Robert L.
5-12-401-016	56547 Fountain Row Elkhart, IN 46516

5-12-254-001	Grubb, Diane 28426 CR 16 Elkhart, IN 46516
5-12-178-001	Gruver, Paul 28641 CR 16 Elkhart, IN 46516
5-12-411-011	Hahn, Mark A.
5-12-411-012	56740 Upper Parkway Elkhart, IN 46516
5-12-451-002	Hal-Dex Inc.
5-12-451-003	28459 US 33 Elkhart, IN 46516
5-12-452-002	Hal-Dex Inc. 28459 US 33 Elkhart, IN 46516
5-12-331-003	Hamilton, Grady 24808 Buddy St. Elkhart, IN 46516
5-12-255-003	Harrison, Rebecca 28032 CR 16 Elkhart, IN 46516
5-12-332-002	Haslett II, William L. 227 Broadway Haverhill, MA 01830
5-10-301-013	Hein, Glen, R 56726 Ash Road Osceola, IN 46561
5-12-452-001	Hendershott, Paul Richards and Rose Ann 28479 US 33 Elkhart, IN 46516
5-10-301-007	Henderson, Michael 56638 Ash Rd. Osceola, IN 46561
5-12-408-010	Herli, Jack W.
5-12-408-011	2016 W. Indiana Ave. Elkhart, IN 46516
5-12-410-014	Hill, Terence & Bloch, Sharon
5-12-410-015	28395 LaRue Elkhart, IN 46516

5-12-333-002	Hiltz, Eric J. 56590 Shore Ave. Elkhart, IN 46516
5-12-409-009	Holt, Leanon V.
5-12-409-010	56745 Boss Blvd. Elkhart, IN 46516
5-12-405-001	Hoogenbroom, Randall 56508 Elm Ridge Rd. Elkhart, IN 46516
5-12-404-008	Horner, Ella 28359 Illinois Elkhart, IN 46516
5-12-404-009	Horner, Ella May 28359 Illinois St. Elkhart, IN 46516
5-12-330-007	Howard, Robert 56624 Shore Ave Elkhart, IN 46516
5-12-330-006	Howard, Robert 56606 Old Orchard Ln. Elkhart, IN 46516
5-10-151-001	Hup, George Jr. 56310 Ash Rd. Osceola, IN 46561
5-12-452-006	Ignafol, Michael S. Jr. 51412 CR 109 Elkhart, IN 46514
5-12-407-009	Imus, Marian C.
5-12-407-010	Boss Blvd.
5-12-407-011	Elkhart, IN 46516
5-12-407-012	
5-12-476-012	JMI Corp 55927 Rivershores Est. Elkhart, IN 46516
5-12-410-005	Johnson, F. James
5-12-410-006	56764 Boss Blvd. Elkhart, IN 46516

5-12-327-005	Kahachenko, Olga 56491 Shore Ave. Elkhart, IN 46516
5-12-410-012	Kendall, Kenneth P.
5-12-410-013	28413 LaRue Elkhart, IN 46516
5-12-426-011	Kiel, Fred J. 56721 27th St. Elkhart, IN 46516
5-12-426-013	Kiel, Fred J. 56721 27th St. Elkhart, IN 46516
5-12-452-003	Kiel, Fredrick J. 23959 CR 16 Elkhart, IN 46516
5-12-451-004	Kiel, Fredrick 23959 CR 16 Elkhart, IN 46516
5-12-405-005	Kijak, Bernard 56566 Elm Ridge Rd. Elkhart, IN 46516
5-12-329-003	Kildow, Charlene M. 56613 Shore Ave. Elkhart, IN 46516
5-12-404-001	Killinger, Rachel B. 56543 Elm Ridge Rd. Elkhart, IN 46516
5-12-404-003	Kinder, Karl 56584 Boss Blvd. Elkhart, IN 46516
5-12-403-015	Kinder, Karl K. II 56597 Boss Blvd. Elkhart, IN 46516
5-12-408-001	King, Marty 56632 Boss Blvd. Elkhart, IN 46516

5-12-412-002	Kittredge, Paul 56620 Elm Ridge Rd. Elkhart, IN 46516
5-10-301-012	Klein, Doris & Spriggs, Carolyn L. 56718 Ash Road Osceola, IN 46561
5450-301-009	Klein, Everett 56668 Ash Road Osceola, IN 46561
5-12-377-002	Kohler, Danny R. 56728 Shore Ave. Elkhart, IN 46516
5-12-329-001	Kramer, Joseph M. 28612 Illinois Elkhart, IN 46516
5-10-301-005	Kuhn, John J. 56610 Ash Rd. Osceola, IN 46561
5-12-380-013	Leazenley, John c/o B.L., Hershberger 29199 CR 22 Elkhart, IN 46516
5-12-380-014	Leazenley, John c/o B.L., Hershberger 29199 CR 22 Elkhart, IN 46516
5-12-409-012	Lese, Albert H. 56783 Boss Blvd. Elkhart, IN 46516
5-12-403-012	Loomis, James D. 56541 Boss Blvd. Elkhart, IN 46516
5-12-407-013 5-12-407-014	Lowther, Gene 56665 Boss Blvd Elkhart, IN 46516
5-12-426-016	Lundgren, Kenneth 28178 CR 16 Elkhart, IN 46516

5-12-379-006	Maier, Rose c/o Mc Ginnis 24721 Necedah Elkhart, IN 46516
5-12-331-001	Mast, Willard 56490 Shore Ave. Elkhart, IN 46516
5-12-376-005	Matthews, George 56705 Shore Ave. Elkhart, IN, 46516
5-12-405-006	Matthews, Noelle 56580 Elm Ridge Rd. Elkhart, IN 46516
5-12-254-005	Mauser, George 28398 CR 16 Elkhart, IN 46516
5-12-254-004	Mauser, George 28398 CR 16 Elkhart, IN 46516
5-12-405-016	Maxwell, James 56530 Elm Ridge Rd. Elkhart, IN 46514
5-12-330-011	McLaughlin, Daisy 56683 Shore Ave. Elkhart, IN, 46516
5-10-301-020	McPhee, Patrick R. 56528 Ash Ed. Osceola, IN 46561
5-10-301-021	McPhee, Robert D. 56464 Ash Rd. Osceola, IN 46561
5-10-301-019	McPhee, Robert D. 65464 Ash Rd. Osceola, IN 46561
5-10-301-022	McPhee, Robert D. 56464 Ash Rd. Osceola, IN 46561

5-10-151-004	McPhee, Robert D. 56464 Ash Rd. Osceola, IN 46561
5-12-377-009	Medley, David T. 56700 Shore Ave. Elkhart, IN 46516
5-12-411-007	Moore, Richard L.
5-12-411-008	56708 Upper Parkway
5-12-411-009	Elkhart, IN 46516
5-12-256-001	Navarro, Ismael A. 56508 Boss Blvd. Elkhart, IN 46516
5-12-333-001	Newell, Mary Collen 56570 Shore Ave. Elkhart, IN 46516
5-12-380-005	Newton, Betty J. c/o King, B. 51637 Walerko Dr. Elkhart, IN 46516
5-12-255-005	Nolan, Calvin 56536 Spring Ave. Elkhart, IN 46516
5-12-402-005	Nyler, Randall
5-12-254-013	56565 Spring Ave. Elkhart, IN 46516
5-12-403-001	Oakley, Jeffrey L.
5-12-403-002	56562 Spring Ave. Elkhart, IN 46516
5-12-406-028	Owen, Jeffrey J. 56699 Spring Ave Elkhart, IN 46516
5-12-403-028	Palmer, Rick 56646 Spring Ave. Elkhart, IN 46516
5-12-426-001	Petlit, Donald Jr. 28216 CR 16 Elkhart, IN 46516

5-12-333-006	Pletcher, Daisy 56683 Shore Ave. Elkhart, IN 46516
5-12-333-007	Pletcher, Walter 56593 Best Ave. Elkhart, IN 46516
5-12-402-003	Potts Gary P. Sr. 29781 Cardevial Ave. Elkhart, IN 46516
5-12-406-029	Potts, Leroy 57085 Tower Rd. Elkhart, IN 46516
5-12-408-029	Reinhart, Myron L. 56631 Upper Parkway Elkhart, IN 46516
5-12-402-001 5-12-254-010	Ritchie, Wesley H. 56496 Fountain Row Elkhart, IN 46516
5-12-409-011	Roberts, James A. 56764 Boss Blvd. Elkhart, IN 46516
5-10-351-015	Roberts, Brian C 56762 SR 219 Osceola, IN 46561
5-12-410-001 5-12-410-002	Roberts, James A. 56764 Boss Blvd. Elkhart, IN 46516
5-12-408-021 5-12-408-022	Robertson, Randall H. 29421 Rivershore Elkhart, IN 46516
5-12-412-004	Robinson, Micheal K. 56658 Elm Ridge Rd. Elkhart, IN 46516
5-12-412-007 5-12-412-008	Robinson, Daniel J. 56694 Elm Ridge Rd Elkhart, IN 46516
5-12-179-001	Rockwell, Rodney 10421 Apple Tree Ln. Osceola, IN 46561

5-12-380-006	Schrock, Melvin 56806 Shore Ave Elkhart, IN 46516
5-12-426-002	Sehring, James F. 28192 CR 16 Elkhart, IN 46516
5-12-412-009	Sellers, Stephen E. 56712 Elm Ridge Rd. Elkhart, IN 46516
5-12-408-002	Smeltzer, Grace 28352 Illinois Elkhart, IN 46516
5-12-380-015	Smith, Harvey 56200 Riverdale Elkhart, IN 46516
5-12-331-002	Smith, Linda 28547 Warren St. Elkhart, IN 46516
5-12-401-008	Smithers, Richard 28489 Illinois Elkhart, IN 46516
5-12-408-016	Sparks, Roger
5-12-408-027	56723 Spring Ave.
5-12-408-028	Elkhart, IN 46516
5-12-380-016	State Highway Commission State House Indianapolis, IN 46200
5-12-255-001	Stutzman, Jeffery 56518 Spring Ave Elkhart, IN 46516
5-12-255-004	Stutzman, Jeffrey 56518 Spring Ave. Elkhart, IN 46516
5-12-410-009	Sulkowski, Norman A.
5-12-410-010	56745 Spring Ave. Elkhart, IN 46516
5-12-403-022	Swienpoel, Jack 56588 Spring Ave. Elkhart, IN 46516

5-12-331-004	Taylor, Ella 28511 Warren Ave. Elkhart, IN 46516
5-12-376-010	The Bresse Church 56773 Shore Ave. Elkhart, IN 46516
5-12-332-005	Tompkins, Charles & Rose 56548 Shore Ave. Elkhart, IN 46516
5-12-328-009	Tompkins, Rose & Richard 56545 Shore Ave Elkhart, IN 46516
5-12-328-008	Tompkins, Rose & Richard 56545 Shore Ave. Elkhart, IN 46516
5-12-328-010	Tompkins, Rose & Richard 56545 Shore Ave Elkhart, IN 46516
5-12-404-002	Troger, Albert A. 56570 Boss Blvd. Elkhart IN 46516
5-12-253-001	Vaughn, Betty
5-12-253-002	28478 CR 16
5-12-253-003	Elkhart, IN 46516
5-12-408-003	Walker, John F.
5-12-408-004	28310 Illinois St.
5-12-408-005	Elkhart, IN 46516
5-12-408-019	Wallen, Neal
5-12-408-020	56649 Upper Parkway Elkhart, IN 46516
5-12-403-027	Walters, Richard 56530 Spring Ave. Elkhart, IN 46516
5-12-407-006	Warner, Katherine & West, Margaret
5-12-407-007	56684 Spring Ave. Elkhart, IN 46516
5-12-409-001	Weaver, Dennis M.
5-12-409-002	28468 Alfred Ct.
5-12-409-008	Elkhart, IN 46516

5-10-301-014	Wells, Samuel G 56738 Ash Road Osceola, IN 46561
5-12-426-005	White, Roger 56663 27th St. Elkhart, IN 46516
5-12-380-012	Williams, Lydia 56801 Best Ave. Elkhart, IN 46516
5-12-401-009	Williams, Larry
5-12-253-013	56507 Fountain Row Elkhart, IN, 46516
5-12-329-006	Woolwine, Bobby Allen 56589 Shore Ave. Elkhart, IN 46516
5-12-454-002	Wyland, Earl 28301 US 33 Elkhart, IN 46516
5-12-451-005	Yeoman, Robert R. 55367 Cedar Ridge Road Elkhart, IN 46516
5-12-452-004	Yeoman, Robert R. P.O. Box 461 Elkhart, IN 46516

CHARLES STREET AND VISTULA STREET

10-9-14-1045-0840.19	Anderson, Rex & Helen 56677 White Street Osceola, IN 46561
10-9-14-1045-0840.20	Anderson, Rex & Helen 56677 White Street Osceola, IN 46561
10-9-14-1045-0840.10	Baker, Dale & Ann 56801 Ash Road Osceola, IN 46561
10-9-14-1046-0883.32	Balanow, Harry & Shirlee 114 W. Mishawaka Ave. Mishawaka, IN 46545
10-9-14-1046-0861	Barsoda, Helen 10401 Vistula Road Osceola, IN 46561
10-9-14-1046-0880	Barsoda, Robert & Mary 10325 Lehman Road Osceola, IN 46561
10-9-14-1076-1959	Bell, Jerry & Janet 10290 Neely Street Osceola, IN 46561
10-9-14-1046-0883.25	Bender, Geoffrey & Kathleen 10152 Vistula Road Osceola, In 46561
10-9-14-1046-0883.18	Bennett, Lloyd & Mardell 10111 Vistula Road Osceola, IN 46561
10-9-14-1075-1915; 10-9-14-1075-1914	Binks, Claude & Fretta 56715 Ash Road Osceola, In 46561
10-9-14-1075-1880	Bishop, Harold & Laura 10184 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-0860.02	Blanchard, William & Katherine 10529 Vistula Road Osceola, IN 46561

10-9-14-1076-1945	Books, Everett & Charlene 10362 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-0884	Bowers Jay D. & Noreen Georgia 56447 Ash Road Osceola, IN 46561
10-9-14-1133-5185	Bradberry, Dean & Kathleen 56442 Eastview Dr. Osceola, IN 46561
10-9-14-1046-0883.45	Bradberry, Robert & Sharon 10141 Vistula Road Osceola, IN 46561
10-9-14-1046-0860.07	Brady, Gladys 10467 Vistula Road Osceola, IN 46561
10-9-14-1133-5197	Bralick, Edward & Kathryn 56578 Eastview Dr. Osceola, IN 46561
10-9-14-1075-1902	Briesacker, Diane 10083 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-0875	Brown, Harold & Edna 56415 White Street Osceola, IN 46561
10-9-14-1075-1883	Buell, Larry & Linda 10170 Glendwood Ave. Osceola, IN 46561
10-9-14-1075-1897	Burggraf, Douglas & Peggy 723 East Butteil Mishawaka, IN 46545
10-9-14-1045-0840.06	Butler, Greg & Lori 10070 Charles Street Osceola, IN 46561
10-9-14-1046-0883.13	Campbell, Thomas & Dorothy 10268 Vistula Road Osceola, IN 46561
10-9-14-1046-0883.09	Candler, Sandra 10306 Vistula Road Osceola, IN 46561

10-9-14-1045-0837.08	Carbone, Josphe 56523 Eastview Dr. Osceola, IN 46561
10-9-14-1045-0839.09	Cartwright, Kevin & Mariam 10045 Charles Street Osceola, IN 46561
10-9-14-1075-1870	Casper, Lester & Lilly 10230 Neely Street Osceola, IN 46561
10-9-14-1046-0860.13	Chikar, Joseph & Carole 10419 Vistula Road Osceola, IN 46561
10-9-14-1046-0883.36	Chipps, Richard & Kelly 10218 Lehman Road Osceola, IN 46561
10-9-14-1076-1933	Close, David & Kathy 10444 Glenwood Ave. Osceola, IN 46561
10-9-14-1076-1954	Close, Paul & Ruth 10310 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-0864	Coleman, Roger 10379 Vistula Road Osceola, IN 46561
10-9-14-1046-0860.11; 10-9-14-1046-0860.12	Cowen, Richard & Peggy 10425 Vistula Road Osceola, IN 46561
10-9-14-1046-0860.05	Cox, Susan 10479 Vistula Road Osceola, IN 46561
10-9-14-1075-1890	Cripe, Clifton & Jeanette 56802 First Street Osceola, IN 46561
10-9-14-1045-0837.05	Crumb, Neil & Dorothy 56469 Eastview Dr. Osceola, IN 46561
10-9-14-1046-0883.52	Custom Kitchen & Colors, Inc. P.O. Box 203 Osceola, IN 46561

10-9-14-1075-0841.08	Cybulski, Donald 10217 Neely Street Osceola, IN 46561
10-9-14-1045-0841.02	Cybulski, Donald 10217 Neely Street Osceola, IN 46561
10-9-14-1046-0883.20	DeFreese, Louis 30632 N. Shore Dr. Elkhart, IN 46514
10-9-14-1075-1887	Delater, Henry & Anna 10161 Glenwood Ave. Osceola, IN 46561
10-9-14-1045-0840.13	Delater, Terry & Caroline 10080 Charles Street Osceola, IN 46561
10-9-14-1181-7116	Denman, Stephen & Betty 10253 Neely Street Osceola, IN 46561
10-9-14-1045-0840.16	Devenney, John & Donnabelle 10342 Charles Street Osceola, IN 46561
10-9-14-1046-0866	Diettrich, Harold & Mildred 10353 Vistula Road Osceola, IN 46561
10-9-14-1133-5197.01	Diettrich, Larry & Marie 10475 Neely Street. Osceola, IN 46561
10-9-14-1046-0882	Dougall, Charles & Agnes Ann 10326 Vistula Road Osceola, IN 46561
10-9-14-1045-0839.08	Eggleston, Wayne & Elizabeth 4631 Connecticut Street Elkhart, IN 46514
10-9-14-1046-0872	Ermon, Beck 55820 River Shore Estates Elkhart, IN 46514
10-9-14-1075-1896	Eshelman, Thelma 10103 Glenwood Ave. Osceola, IN 46561

10-9-14-1075-1900	Fisher, Rickey & Melinda 10048 Neely Street Osceola, IN 46561
10-9-14-1046-0883.37	Forsythe, Vern & Marjorie 10244 Lehman Road Osceola, IN 46561
10-9-14-1076-1940	Friesner, Joel & Susan 56801 White Street Osceola, IN 46561
10-9-14-1076-1962	Friesner, Leo & Ruth 10278 Neely Street Osceola, IN 46561
10-9-14-1075-1910	Friesner, Lowell & Laurette 56801 Ash Road Osceola, IN 46561
10-9-14-1075-1894	Funkhouser, Paul & Geneva 10106 Neely Street Osceola, IN 46561
10-9-14-1046-0883.08	Gall, William & Carol 10147 Vistula Road Osceola, IN 46561
10-9-14-1133-5175	Garlat, Dennis & Terri 10488 Vistula Road Osceola, IN 46561
10-9-14-1046-0868.02; 10-9-14-1046-0869	Geyer, David & Ann 10287 Vistula Road Osceola, IN 46561
10-9-14-1045-0837.14	Geyer, William & Madaline 56055 Eastview Dr. Osceola, IN 46561
10-9-14-1046-0868.01	Gramenz, Mary 10311 Vistula Road Osceola, IN 46561
10-9-14-1045-0839.03	Grib, Paul & Agnes P.O. Box 105 Osceola, IN 46561
10-9-14-1046-0883.34	Griffin, Earl & Diane 10188 Lehman Road Osceola, IN 46561

10-9-14-1076-1942	Grove, Howard 56833 White Street Osceola, IN 46561
10-9-14-1075-1873	Grzeskowiak, Jack & Marcelle 10216 Neely Street Osceola, IN 46561
10-9-14-1076-1963	Haeck, Albin & Gloria 10266 Glenwood Ave. Osceola, In 46561
10-9-14-1045-0841.09	Hall, Sharon 10191 Neely Street Osceola, IN 46561
10-9-14-1046-0883.21	Henderson, David 10204 Vistula Road Osceola, IN 46561
10-9-14-1045-0840.02	Henderson, Thomas & Barbara 10046 Charles Street Osceola, IN 46561
10-9-14-1076-1941	- Hepler, Jeannette Wurzburg AM HS Unit 26625 APO, AE 09244
10-9-14-1045-0837.13	Higginson, Edward & Virginia 56547 Eastview Dr. Osceola, IN 46561
10-9-14-1075-1882	Higginson, Edward & Virginia 56547 Eastview Dr. Osceola, IN 46561
10-9-14-1133-5196.01; 10-9-14-1133-5196	Hinkle, Donald & Kathy 56574 Eastview Dr. Osceola, IN 46561
10-9-14-1045-0837.07	Hofferth, Jack & Janet 56479 Eastview Dr. Osceola, IN 46561
10-9-14-1046-0883.05	Hopper, Jack & Donna 10109 Vistula Road Osceola, IN 46561

10-9-14-1133-5177	Hopper, Philip & Edith 10478 Vistula Road Osceola, IN 46561
10-9-14-1046-0883.04; 10-9-14-1046-0881	Hopper, Randy & Dorothy 10352 Vistula Road Osceola, IN 46561
10-9-14-1045-0837.15	Hueni, Herbert, Phyllis 56059 Eastview Dr. Osceola, IN 46561
10-9-14-1076-1952	Hyatte, Ora & Louisa 10326 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-0883.07	Jennings, Henry 10095 Vistula Road Osceola, IN 46561
10-9-14-1075-1881	Johnson, Robert & Ruth 10191 Glenwood Ave. Osceola, IN 46561
10-9-14-1045-0841.03	Kamp, Lester & Carolyn 10173 Neely Street Osceola, IN 46561
10-9-14-1133-5181; 10-9-14-1133-5182	Kempf, Margaret & Thomas 10442 Vistula Road Osceola, IN 46561
10-9-14-1045-0840.17	Keranen, Eugene & Charmien 10342 Charles Street Osceola, IN 46561
10-9-14-1045-0839.11	Kittredge, Paul & Nina 10155 Charles Street Osceola, IN 46561
10-9-14-1076-1934	Klotz, Donald & Barbara 10443 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-0878.02	Koelz, Darrell & Iota 11894 Buttercup Granger, IN 46530
10-9-14-1045-0840	Kollar, Robert & Sharon 10294 Charles Street Osceola, IN 46561

10-9-14-1133-5178; 10-9-14-1133-5179	Lambert, James & Lynn 10452 Vistula Road Osceola, IN 46561
10-9-14-1046-0883.30	Likes, Earl 10133 Vistula Road Osceola, IN 46561
10-9-14-1076-1929	Loft, Robert 10466 Glenwood Ave. Osceola, IN 46561
10-9-14-1045-0837.10	Logan, Don & Mabel 56449 Eastview Dr. Osceola, IN 46561
10-9-14-1076-1958	Long, George 5045 M. North Gull Lake Dr. Hickory Corners, MI 49060
10-9-14-1075-1912	Loyner, Brian & Janet 56755 Ash Road Osceola, IN 46561
10-9-14-1046-0883.27	Maggart, Mark & Donna 10132 Vistula Road Osceola, IN 46561
10-9-14-1076-1936	Mahoney, Daniel & Sandra 10422 Glenwood Ave. Osceola, IN 46561
10-9-14-1075-1909; 10-9-14-1075-1908	Maier, Dovie 10049 Glenwood Ave. Osceola, IN 46561
10-9-14-1075-1886	Mark, Tina 10160 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-0883.48	May, John 10225 Vistula Road Osceola, IN 46561
10-9-14-1075-1877	McDonald, Ronald & Edna 10202 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-1932	McFarland, Harry & Vivian 10450 Neely Street Osceola, IN 46561

10-9-14-1076-1920; 10-9-14-1076-1921	McGillen, Diane 56748 Eastview Dr. Osceola, IN 46561
10-9-14-1076-1919	McGillen, Diane 56748 Eastview Drive Osceola, IN 46561
10-9-14-1046-0883.49	McGuire, Marcia 10112 Lehman Road Osceola, IN 46561
10-9-14-1075-1876	Merrill, Ronald 10204 Neely Street Osceola, IN 46561
10-9-14-1046-0860.08	Metzler, Earl 10461 Vistula Road Osceola, IN 46561
10-9-14-1045-0839.07	Meyers, Harold & Kathryn 10089 Charles Street Osceola, IN 46561
10-9-14-1045-0840.21	Miles, Martin & Vicki 10456 Charles Street Osceola, IN 46561
10-9-14-1046-0883.35	Miles, Wanda 10198 Lehman Road Osceola, IN 46561
10-9-14-1045-0840.24	Miller, Michael & Sue Ann 10186 Charles Street Osceola, IN 46561
10-9-14-1045-0837.03	Mitcheff, Michael & Rita 56411 Eastview Dr. Osceola, IN 46561
10-9-14-1046-0883.03; 10-9-14-1046-0883.29	Montgomery, Gerald 10277 Vistula Road Osceola, IN 46561
10-9-14-1181-7117	Moore, John & Gertrude 56595 Brink Ave. Osceola, IN 46561
10-9-14-1045-0841.01	Moore, Ned & Violet 10061 Neely Street Osceola, IN 46561

10-9-14-1076-1923	Moran, Danny 56730 Eastview Dr. Osceola, IN 46561
10-9-14-1076-1917	Moran, Richard & Donna 56784 Eastview Drive Osceola, IN 46561
10-9-14-1045-0840.12	Mowrer, Calvin & Nellie 1332 W. Lusher Elkhart, IN 46515
10-9-14-1075-1913	Moyer, Kathaleen S. 56741 Ash Road Osceola, IN 46561
10-9-14-1046-0883.55	Murphy, Edward & Mary Ann 10155 Vistula Road Osceola, IN 46561
10-9-14-1045-0841.10	Nay, Cynthia 10101 Neely Street Osceola, IN 46561
10-9-14-1045-0841.11	Nay, Gerald & Lois 3214 Vista Oaks Circle Palm Bay, FL 32905
10-9-14-1075-1878	Nelson, Peggy 10205 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-0883.12	New Apostolic Church of Northern America 3753 N. Troy Street Chicago, IL 60618
10-9-14-1046-0860.03	Newcomer, Rex 10507 Vistula Road Osceola, IN 46561
10-9-14-1045-0840.08	Nickerson, Gordon & Melodie 56647 Ash Road Osceola, IN 46561
10-9-14-1045-0843; 10-9-14-1045-0844	Nickerson, Ronald F. & Judith K. 56673 Ash Road Osceola, IN 46561

10-9-14-1046-0883.42	North Central District Missionary 28042 C.R. 24 West Elkhart, IN 46517
10-9-14-1046-1931	Olena, Donald & Dorothy 10466 Neely Street Osceola, IN 46561
10-9-14-1045-0840.05; 10-9-14-1045-0840.11	Pearson, Charles J. 56627 Ash Road Osceola, IN 46561
10-9-14-1075-1899	Pellum, Alvia & Marcella 10093 Glenwood Ave. Osceola, IN 46561
10-9-14-1075-1885	Phillips, Harold Jr. & Carol 10136 Neely Street Osceola, IN 46561
10-9-14-1046-0863	Presnell, Diana 10381 Vistula Road Osceola, IN 46561
10-9-14-1045-0837.11	Pressler, Dale & Ida 806 Fremont Street Elkhart, IN 46516
10-9-14-1076-1953	Quist, Henry & Carol 10330 Neely Street Osceola, IN 46561
10-9-14-1046-0883.15	Relicke, John 10288 Vistula Road Osceola, IN 46561
10-9-14-1046-0860.09	Rice, Larry 30903 Creekwood Trail Osceola, IN 46561
10-9-14-1075-1895	Ritchie, Edward & Dorothy 10120 Glenwood Ave. Osceola, IN 46561
10-9-14-1045-0840.25	Russel, Donna 10158 Charles Street Osceola, IN 46561
10-9-14-1045-0839	Scott, Kenneth & Rebecca 56549 Ash Road Osceola, IN 46561

10-9-14-1046-0883.31	Sellers, James & Ruth 10345 Vistula Road Osceola, IN 46561
10-9-14-1045-0837.16	Semprevio, Philip & Rose 10545 Vistula Dr. Osceola, IN 46561
10-9-14-1046-0860.04	Shaffer, Peggy 702 West Sigler Hebron, IN 46341
10-9-14-1046-0883.28	Shannon, Larry & Sherry 10104 Vistula Road Osceola, IN 46561
10-9-14-1046-0883.51	Sharp, Virgle & Jean 10092 Lehman Road Osceola, IN 46561
10-9-14-1075-1893	Shidler, David & Michelle 10135 Glenwood Ave. Osceola, IN 46561
10-9-14-1045-0837.06	Shultz, Carl & Patricia 56681 Eastview Dr. Osceola, IN 46561
10-9-14-1076-1955	Silveus, Gerl & Lois 10311 Glenwood Ave. Osceola, IN 46561
10-9-14-1075-1889	Simper, Robert & Mary 10140 Glenwood Ave. Osceola, IN 46561
10-9-14-1075-1868	Slusser, Paul & Archibald 10250 Glenwood Ave. Osceola, IN 46561
10-9-14-1045-0841.05	Smith, Anna Sue 10135 Neely Street Osceola, IN 46561
10-9-14-1045-0839.04	Smith, Ronald & Nadine 56567 Ash Road Osceola, IN 46561
10-9-14-1076-1951	Spencer, James 10330 Glenwood Ave. Osceola, IN 46561

10-9-14-1046-0883.50	Stephens, Rebecca Lanning & Cindy 10096 Lehman Road Osceola, IN 46561
10-9-14-1075-1871	Stephens, Terrence & Iris 10236 Glenwood Ave. Osceola, IN 46561
10-9-14-1075-1874	Stephens, Thomas 10222 Glenwood Ave. Osceola, IN 46561
10-9-14-1076-1937	Stith, Wesley & Michelle 10421 Glenwood Ave. Osceola, IN 46561
10-9-14-1045-0842	Strychalski, David & Tina 10077 Neely Street Osceola, IN 46561
10-9-14-1045-0837.17	Van Keuren, James & Janice 56577 Eastview Dr. Osceola, IN 46561
10-9-14-1133-5194	VanDurman, Patrick 56546 Eastview Dr. Osceola, IN 46561
10-9-14-1133-5192	VanKeuren, James & Janice 56577 Eastview Dr. Osceola, IN 46561
10-9-14-1046-0883.44	Vernum, Andrew 19660 SR 117 Culver, IN 46511
10-9-14-1133-5187	Vittetoe, Ricky & Patricia 56456 Eastview Dr. Osceola, IN 46561
10-9-14-1133-5189; 10-9-14-1133-5188	Vittetoe, Ricky & Patricia 56456 Eastview Dr. Osceola, IN 46561
10-9-14-1046-0883.46; 10-9-14-1046-0883.33	Waidelich, Jon & Doreen 10162 Lehman Road Osceola, IN 46561
10-9-14-1045-0837.09	Walter, Melvin & Emma 56735 Eastview Dr. Osceola, IN 46561

10-9-14-1076-1935	Ward, Kenneth & Lynda 10438 Neely Street Osceola, IN 46561
10-9-14-1045-0840.03	Weaver, Harvey 10110 Charles Street Osceola, IN 46561
10-9-14-1046-0883.58	Weinberg, Carol 12253 East Jefferson Mishawaka, IN 46545
10-9-14-1076-1960	Weston, Shirley & Mary 10276 Glenwood Ave. Osceola, IN 46561
10-9-14-1076-1964	Weston, Steven & Wanda 10259 Glenwood Ave. Osceola, IN 46561
10-9-14-1133-5172	White, William & Stephanie 10536 Vistula Road Osceola, IN 46561
10-9-14-1076-1946	Widup, Richard & Darlene 10349 Glenwood Ave. Osceola, IN 46561
10-9-14-1076-1949	Wilkerson, Debra 10347 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-0871	Williams, Herschel & Elizabeth 10245 Vistula Road Osceola, IN 46561
10-9-14-1076-1947	Wilson, Roland & Francis 10360 Neely Street Osceola, IN 46561
10-9-14-1075-1901	Witmer, Mervin & Inez 56835 Ash Road Osceola, IN 46561
10-9-14-1076-1961	Woodard, Glendon & Sharon 10275 Glenwood Ave. Osceola, IN 46561
10-9-14-1046-0874	Young, Michael & Marla 10509 Wade Street Osceola, IN 46561

10-9-14-1076-1930	Young, Charles 10461 Glenwood Ave. Osceola, IN 46561
10-9-14-1076-1924; 10-9-14-1076-1925	Young, Richard 56704 Eastview Dr. Osceola, IN 46561
10-9-14-1046-0883.10	Yutzy, Clarence & Ella 5980 Brown Lane Sarasota, Fl 34232
10-9-14-1045-0837	Zemialkowski, Walter & Betty 56499 Eastview Dr. Osceola, IN 46561

3.0 PERMITS AND APPROVALS

As stated in the 30%, 60%, and 95% design documents, most permits pertaining to the construction of the proposed project can not be applied for until final plans and specifications are complete. However, preliminary contact has been initiated with local authorities and is ongoing. Some significant contacts and the results are included below.

3.1 City of Elkhart

Review of the project plans and specifications by the City Network Engineer has been completed with those comments incorporated into the project plans. The draft main extension agreement has been revised and re-submitted to the City officials and is being reviewed by the City legal counsel. The document will be reviewed by the Board of Public Works at the next regularly scheduled meeting on April 5th.

3.2 Elkhart County

Project plans and specifications have been submitted to the Elkhart County Department of Public Services. Several follow up discussions and meetings having been held between County Staff and the ENGINEER.

Building department officials are continuing to discuss plumbing alteration permit requirements and have indicated that a blanket permit listing user names and addresses will be preferred. Permit fees are under negotiation as officials have indicated that actual inspection may be waived and handled by affidavit or some other method issued at completion by the project engineer. Officials have further indicated that well closing may be inspected by Conrail's consultant with local health department staff providing training and guidance. Inspection fees yet to be determined.

As a part of local building permit acquisition, Conrail will be required to apply for a special use variance to the Elkhart County ordinance zoning for the fire pressure booster station. The selected site is located in an R-1 (residential-single family) zone and will require a public hearing before the Board of Zoning appeals. This action will take 30 days minimum but can be done concurrently to IDEM review of the water system plans.

The Elkhart County Commissioners, the Department of Public Services, as well as legal counsel have expressed (in writing) strong hesitation in endorsing the project and have further stated that detail review of the project will not be possible until an interlocal agreement between Conrail, Elkhart County, and possibly the City of Elkhart is complete and in place. A copy of a letter outlining their position was included in the 95% design documents.

The County has indicated that it may seek to prohibit the installation of the groundwater extraction system and possibly the water main within public right of way. If this requirement becomes a reality, acquisition of private easements could seriously effect the project design, cost and estimated completion date. Further discussions with County officials have been conducted where Conrail has been advised that the County Commissioners will set policy regarding these concerns during a work session with

Elkhart County staff members. However, this information was not provided by the date of this report.

3.3 St. Joseph County

Review by the St. Joseph County Highway Department has been conducted with no comments effecting project design offered.

Plumbing alteration permits will be handled by a blanket permit, listing user names and addresses. Building department personnel will conduct individual inspections and affix approval tags to each installation. As a part of local permit acquisition, Conrail will be required to apply for and obtain a special use variance for extraction wells located on private property. This variance to the St. Joseph County zoning ordinance will require two public hearings, the first being with the Board of Zoning Appeals, the second being the St. Joseph County Council. This will take 45 days minimum. This can be done concurrently with review of the extraction system by IDEM.

The proposal to extend water supply transmission mains to the Vistula and Charles Street area from the City of Mishawaka has been considered and discussed with no clear resolution having been reached. Accordingly, Conrail must move forward with the project as designed. An interlocal agreement for providing water service from the City of Elkhart to homes in St. Joseph County may still be needed and if so, should be reached before the project is constructed.

3.4 Permit Sequence and Time Line

The following outline provides a general understanding of review periods and approvals for the forgoing permitting requirements and those specified in the 30% and 60% design documents.

- A. City of Elkhart - Water Main Extension Agreement.
Review in process
Expected approval April 5, 1994
- B. I.D.E.M. - Public Water System Construction Permit
Application April 10, 1994
Expected approval June 11, 1994
- C. INDOT - Right of Way Construction Permit
Application April 10, 1994
Expected approval June 11, 1994
- D. Elkhart County - Special Use Variance
Application April 25, 1994
Expected approval May 19, 1994
- E. St. Joseph County - Special Use Variance
Application April 12, 1994

Board of Zoning Appeals Approval - May 4, 1994
St. Joseph County Council Approval - May 6, 1994

- F. Elkhart County Interlocal Agreement
Review in process
Expected approval - unknown
- G. St. Joseph county Interlocal Agreement
Expected approval - unknown
- H. Elkhart County R.O.W. Permit
Application - after contract award
Expected approval - 2 weeks after application
- I. St. Joseph County R.O.W. Permit
Application - after contract award
Expected approval - 2 weeks after application
- J. Elkhart County Plumbing Alterations Permit
Application - during construction
Expected approval - immediately
- K. St. Joseph County Plumbing Alterations Permit
Application - during construction
Expected approval - immediately

The above time line assumes applications will be made without regard to U.S.E.P.A. approval of the 100% design documents.

Also that reviews and public remonstrance do not significantly interfere with the approval process.

4.0 PRELIMINARY CONSTRUCTION SCHEDULE

The following figure projects a proposed construction schedule utilizing referenced time lines presented in the statement of work and assumes the following:

- * The resolution of all issues with Elkhart County and St. Joseph County regarding the installation of the water main and groundwater extraction system.
- * The approval of the plans by all pertinent parties.
- * The project will be built in two construction seasons with one intervening winter.
- * The potential for seasonal and weather delays was minimized but could increase the length of the project.
- * The contractor will use multiple crews at one time at many locations throughout the project.

CONRAIL ELKHART YARD
MUNICIPAL WATER MAIN EXTENSION
GROUNDWATER EXTRACTION
FORCE MAIN AND DISCHARGE FORCE MAIN

● PRELIMINARY CONSTRUCTION SCHEDULE

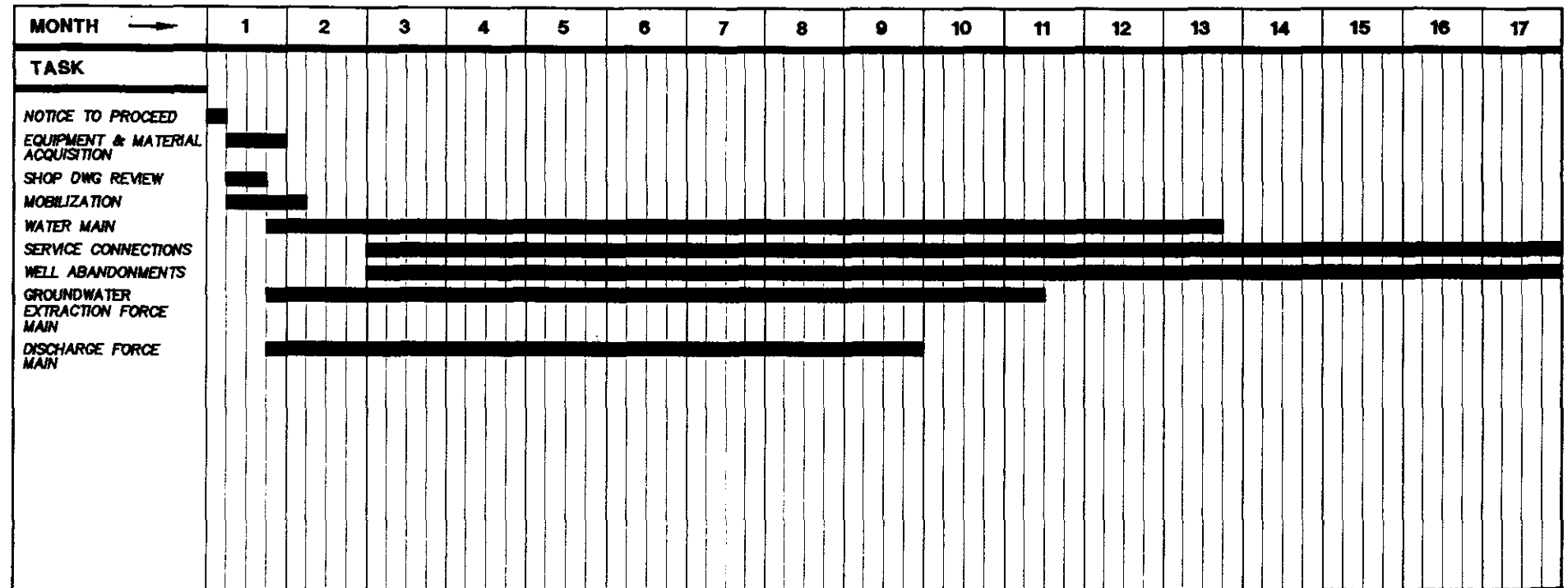


FIGURE 4-1

5.0 PROJECT ESTIMATES

Preliminary project estimates reflect all plan revisions incorporated into the 100% design phase of both the Municipal Water Main and Groundwater Extraction System Force Mains.

The costs for the Municipal Water Main can be expected to range from \$3,200,000.00 to \$5,300,000.00.

The costs for the Groundwater Extraction System Force Main should range from \$575,000.00 to \$950,000.00.

6.0 CONSTRUCTION QUALITY ASSURANCE PLAN

The following information provides for requirements and procedures to insure compliance with project plans and specifications during construction.

CONSOLIDATED RAIL CORPORATION

2001 MARKET STREET
PHILADELPHIA, PA

Construction Quality Assurance

Conrail-Elkhart Yard Municipal

Water Main Extension

And

Groundwater Extraction System Force Main

& Discharge Force Main

March 1994

As Prepared By:

Wightman Petrie, Inc.
2340 Cassopolis Street
Elkhart, IN 46514
Telephone: 219-264-4587

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PART 1

PURPOSE AND SCOPE

The scope of the Construction Quality Assurance Plan includes the following:

- * **Roles & Responsibility** - Each party is identified and their areas of responsibility are detailed.
- * **Meetings** - The pre-construction meeting and monthly progress meetings are detailed as to what is to be accomplished and what information the contractor is expected to have collected for the meeting.
- * **Field Activities** - Details are given for how the water main and force main should be installed. Details are also given for the backfilling of the trenches.
- * **Testing** - Procedures are outlined for hydrostatic pressure and leakage tests as well as the requirements of compaction tests. Also including are the testing requirements of the fire pump building, fire pump, chlorination system, monitoring system and electrical system.
- * **Project Compliance Inspections** - a pre-final and final inspection are required by the USEPA.
- * **Construction Documentation:** The daily reports are shown here with detailed descriptions of the information required.

PART 2

ROLES AND RESPONSIBILITIES

1. Owner and Operator

Consolidated Rail Corporation is the owner of the project and will operate all systems once constructed.

2. Design Engineer

The engineer of record representing the owner in regard to the U.S.E.P.A. order is:

Groundwater Technology, Inc.
3 Edgewater Drive
Norwood, MA 02062

The engineer providing design in regard to this project is:

Wightman Petrie, Inc.
2340 Cassopolis Street
Elkhart, IN 46514

3. Construction Quality Assurance Officer (CQA Officer)

The CQA Officer shall supervise and be responsible for all inspections, testing, and related construction documentation as described in this CQA Plan. The CQA Officer shall be responsible for preparation of construction documentation to certify substantial conformance with the engineering design.

The CQA Officer may delegate observation and documentation duties to qualified technicians with experience in the assigned aspects of construction who shall serve as Resident Project Representatives (RPR). Although these duties may be delegated, the CQA Officer shall retain the responsibility for these activities.

The CQA Officer shall visit the construction site periodically during active periods of construction to personally observe the construction and documentation procedures. Also, at a minimum, the CQA Officer shall personally observe, on at least one occasion, the excavation, backfilling, and compaction of pipe trenches. The CQA Officer shall be readily available for consultation, as needed.

4. Resident Project Representative (RPR)

The RPR shall carry out observation and documentation duties under the direct supervision of the CQA Officer. The RPR shall be qualified technicians with experience in the assigned aspects of construction documentation. The RPR shall prepare summary and inspection reports and shall routinely transmit these reports to the CQA Officer. The RPR shall immediately notify the CQA Officer of any problems or deviations from design plans and specifications. The RPR shall not have authority to approve any design or specification changes without the consent of the CQA Officer.

5. Contractors

Contractors and equipment suppliers will be selected via the competitive bid process.

6. On-Site Health and Safety Representative

Each individual company is responsible for their own employees' health and safety and shall designate a site health and safety representative (HSR). The HSR shall be responsible for implementing safety procedures, conducting or participating in safety meetings (prior to the start of work and on-going), and completing health and safety reports when required.

PART 3

MEETINGS

1. Pre-Construction Meeting

A pre-construction meeting will be planned at a date and time to be determined later. This meeting shall include the parties involved in the construction, including the CQA Officer, RPR, construction and installation contractors, design engineer (Wightman Petrie, Inc.), the U.S. EPA and Indiana Department of Environmental Management (IDEM). The purpose of this meeting is to begin planning for coordination of tasks and to discuss any potential problems that might cause difficulties and delays in construction.

Specific tasks considered for this meeting include the following:

- * Review design details of the project, including the plans and specifications;
- * Review the roles and responsibilities of each party;
- * Review lines of communication;
- * Review the scope of construction documentation and reporting;
- * Review testing requirements;
- * Review the project schedule for all operations;
- * Review project health and safety requirement;

The meeting shall be documented and the minutes shall be distributed to all parties involved in the construction project.

2. Monthly Progress Meetings.

On the 25th of each month, or the closest workday thereto, the contractor or contractor's supervisor, shall attend a progress meeting and submit a monthly progress schedule and a monthly report. The monthly progress schedule shall include the percentage of completion of each separate portion of the work. The monthly report should provide description of the work completed, difficulties encountered, changes in conditions, or other details which may be pertinent to the project construction schedule. The monthly report should also have a section devoted to accomplishments planned for the next month and a plan for returning to schedule if behind.

PART 4

FIELD ACTIVITIES

The CQA Officer or RPR shall be present during critical construction activities to observe the work for conformance to the plans and specifications. The CQA Officer and/or design engineer shall also be available to respond to contractor for requests for interpretation of plans and specifications.

1. Water Main Installation

All water main shall be laid to the alignment and depth shown on the plans unless directed otherwise by the CQA Officer or RPR. All pipes shall be bedded firmly on undisturbed earth with bell holes excavated beneath the bells. Should the Contractor excavate to a depth below the invert of the pipe without the directions of the CQA Officer or RPR, the pipe shall be laid on shaped bedding with compacted granular fill between the pipe and undisturbed earth at the Contractor's expense.

Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be lowered carefully into the trench in such a manner as to prevent damage to water main materials, protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench. Where necessary, the trench shall be dewatered prior to installation of the pipe.

Examination of material - All pipe, fittings, valves, hydrants, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the CQA Officer or RPR, who may prescribe corrective repairs or reject the materials.

Pipe ends - All lumps, blister, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign materials before the pipe is laid.

Cleaning and swabbing - If dirt enters the pipe, it shall be removed and the interior pipe surface swabbed with a 1 percent hypochlorite disinfecting solution. If, in the opinion of the CQA Officer or RPR, the dirt remaining in the pipe will not be removed by the flushing operation, then the interior of the pipe shall be cleaned by mechanical means such as a hydraulically propelled foam pig or other suitable device acceptable to the CQA Officer or RPR, in conjunction with the application of a 1 percent hypochlorite disinfecting solution to the interior pipe surface. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the CQA Officer.

Pipe placement - As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

Pipe plugs - At times when pipe-laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the CQA Officer or RPR. The plug shall be fitted with a means for venting. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation, should the trench fill with water. Prior to removal of the plug for extending the line or for any other reason, air and/or water pressure in the line shall be released.

Flooding by storm or accident during construction - If the main is flooded during construction, it shall be cleared of the flood water by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with a chlorinated potable water that, at the end of a 24-h holding period, will have a free chlorine residual of not less than 25 mg/l. The chlorinated water may then be drained or flushed from the main. After construction is completed, the main shall be disinfected.

2. Force Main Installation

All force main shall be laid to the alignment and depth shown on the plans unless directed otherwise by the CQA Officer or RPR. All pipes shall be bedded firmly on undisturbed earth with bell holes excavated beneath the bells. Should the Contractor excavate to a depth below the invert of the pipe without the directions of the CQA Officer or RPR, the pipe shall be laid on shaped bedding with compacted granular fill between the pipe and undisturbed earth at the Contractor's expense.

Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, and valves, shall be lowered carefully into the trench in such a manner as to prevent damage to force main materials, protective coatings and linings. Under no circumstances shall force main materials be dropped or dumped into the trench. Where necessary, the trench shall be dewatered prior to installation of the pipe.

Examination of material - All pipe, fittings, valves, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the CQA Officer, who may prescribe corrective repairs or reject the materials.

Pipe ends - All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign materials before the pipe is laid.

Pipe cleanliness - foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing, or other materials shall be placed in the pipe at any time.

Pipe placement - As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

Pipe plugs - At times when pipe-laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the owner. The plug shall be fitted with a means for venting. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation, should the trench fill with water. Prior to removal of the plug for extending the line or for any other reason, air and/or water pressure in the line shall be released.

3. Backfilling

The Contractor shall not backfill force main above the top of the pipe until the alignment and the pipe joints have been checked, inspected and approved by the CQA Officer or RPR.

All main, as soon as laid, shall have the space between the pipe and the bottom and sides of the trench packed full by hand and thoroughly tamped with a shovel or light tamper, as fast as placed in layers not exceeding four (4) inches up to the level of the top of the pipe. The filling shall be carried up evenly on both sides, care shall be taken that no rock, frozen material, or other hard substances are placed in contact with the pipe.

The main shall be covered by hand to a depth of at least eight (8) inches. The material shall be placed in layers not exceeding four (4) inches in depth, and each layer thoroughly tamped and compacted, with at least one tamping for each man depositing material in the trench.

Material for backfilling the space between the pipe and the bottom and sides of the trench, and for covering to a depth of two (2) feet, shall be clean dry earth, free from stones larger than two (2) inches, frozen material or other hard substances (except for conditions hereinafter defined).

The remainder of the trench shall be backfilled by using the material originally excavated from the ditch (except for conditions hereinafter defined), to a height slightly above the original elevation of the ground. Backfilling shall not be left unfinished for more than 600 feet behind the completed pipe work.

No heavy rock shall be dropped into the trench nor placed within three (3) feet of the pipe. In depositing rock in the trench, care must be taken that the rock does not injure

the structure. All spaces between pieces of rock shall be filled with earth to insure there being no voids.

Backfilling from the top of the pipe to final grade shall be made in lifts not exceeding twelve (12) inches in depth, and shall meet the requirements of 90% modified proctor for all areas not within the limits of the road-bed or driveways and 95% modified proctor for all areas within the limits of the road-bed or driveways.

PART 5

TESTING

Testing to be done during construction shall be the hydrostatic pressure and leakage test of the water main and force main. Test requirements and acceptable criteria are described below and in the project specifications. Also compaction tests shall be performed on the backfilling of the pipe and on the subgrade of road and driveway replacements.

1. Water Main Testing

A. Hydrostatic Pressure Test:

All new pipe or any valve section thereof, shall be subjected to a hydrostatic pressure test. The hydrostatic test pressure shall be 150 pound per square inch, based on the evaluation of the line under test and corrected to the elevation of the test gauge. The duration of each pressure test shall be at least two (2) hours.

a. Procedure

After the pipe is laid, the joints completed, the newly laid pipe or any valved section thereof shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the CQA Officer or RPR. The pump, pipe connection and all necessary apparatus shall be furnished by the Contractor. The Contractor shall furnish all gauges for the test and arrange to have any required taps made.

b. Expelling Air Before Test

Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blow-off are not available at high places, the Contractor shall provide the necessary taps at points of highest elevation before the test is made and insert plugs after the air has been released and before the pressure test.

c. Corrective Measures

Any cracked or defective pipes, fittings or valves discovered in consequence of this pressure test shall be removed and replaced by the Contractor at his expense with sound material and the test shall be repeated until satisfactory to the CQA Officer.

All joints showing leakage during the test shall be remade until tight to the satisfaction of the CQA Officer.

B. Leakage Test

A leakage test shall be conducted after the pressure test has been satisfactorily completed. The Contractor shall furnish the pump, pipe, connections and all other necessary apparatus including the gauge and measuring device and shall furnish all necessary assistance to conduct the test. The duration of each leakage test shall be two (2) hours and during the test the water main shall be subjected to a pressure of 150 psi.

Leakage is defined as the quantity of water supplied into the newly laid pipe or any valved section thereof, necessary to maintain 150 psi test pressure after the pipe has been filled with water and the air expelled. No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{N * D * \sqrt{P}}{3700}$$

in which L equals the allowable leakage, in gallons per hour, N is the number of joints in the length of pipe in tested, D is the nominal diameter of the pipe, in inches and P is the average test pressure during the leakage test, in pounds per square inches gauge. (The allowable leakage according to this formula is equivalent to twenty-three and three-tenth (23.3) U.S. gallons per twenty-four (24) hours per mile of pipe per inch of nominal pipe diameter for pipe in eighteen (18) foot lengths, evaluated at an average pressure of 150 psi).

Should any test of pipe laid disclose leakage greater than that specified, the Contractor shall, at his sole expense, locate and repair all defective joints until the leakage is within the specified allowance.

The following tables give allowable leakage in gallons per hour per 100 joints and per 1000 feet of water main for various size water mains.

TABLE I

ALLOWABLE LEAKAGE PER 100 JOINTS IN GALLONS PER HOUR

Pipe Size	AVG. TEST PRESSURE 150 PSI Leakage per 100 Joints	AVG. TEST PRESSURE 140 PSI Leakage per 100 Joints
6	1.99	1.92
8	2.65	2.56
10	3.31	3.20
12	3.97	3.84
16	5.30	5.12
20	6.62	6.40
24	7.94	7.68
30	9.93	9.60
36	11.91	11.51

TABLE II

ALLOWABLE LEAKAGE PER 1000' OF MAIN IN GALLONS PER HOUR

Pipe Size	150# Pressure	140# Pressure	130# Pressure	100# Pressure
6	1.10	1.07	1.03	.90
8	1.47	1.42	1.37	1.20
10	1.84	1.78	1.71	1.50
12	2.20	2.13	2.06	1.80
16	2.94	2.84	2.74	2.40
20	3.68	3.55	3.42	3.00
24	4.41	4.26	4.11	3.60
30	5.52	5.33	5.14	4.50

2. Force Main Testing

A. Hydrostatic Pressure Test

All new pipe, or any valved section thereof, shall be subjected to a hydrostatic pressure test. The hydrostatic test pressure shall be 150 pounds per square inch, based on the elevation of the line or section of line under test and corrected to the elevation of the test gauge. The duration of each pressure test shall be at least two (2) hours.

a. Procedure

After the pipe is laid, the joints completed, the newly laid pipe or any valved section thereof shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the CQA Officer or RPR. The pump, pipe connection and all necessary apparatus shall be furnished by the Contractor. the Contractor shall furnish all gauges for the test and arrange to have any required taps made.

b. Expelling Air Before Test

Before applying the specified test pressure, all air shall be expelled from the pipe.

c. Corrective Measures

Any cracked or defective pipes, fittings or valves discovered in consequence of this pressure test shall be removed and replaced by the Contractor at his expense with sound material and the test shall be repeated until satisfactory to the CQA Officer or RPR.

All joints showing leakage during the test shall be remade until tight to the satisfaction of the CQA Officer or RPR.

B. Leakage Test

A leakage test shall be conducted after the pressure test has been satisfactorily completed. The Contractor shall furnish the pump, pipe, connections and all other necessary apparatus including the gauge and measuring device and shall furnish all necessary assistance to conduct the test. The duration of each leakage test shall be two (2) hours and during the test the force main shall be subjected to a pressure of 150 psi.

Leakage is define as the quantity of water supplied into the newly laid pipe or any valved section thereof, necessary to maintain 150 psi test pressure after the pipe has been filled with water and the air expelled. Leakage allowance shall be as per the manufacturers minimum tolerance.

3. Compaction Testing

A. Not Within Roadway or Driveways

For all areas not within the limits of the road-bed or driveway trench, compaction tests shall meet the specifications of 90% Modified Proctor. Tests shall be taken for each twelve (12) inch maximum lift with one (1) test per lift every 500 feet.

B. Within Roadway or Driveways

For all areas within the limits of the road-bed or driveway, compaction tests shall meet the specifications of 95% Modified Proctor. These shall be taken for each twelve (12) inch maximum lift with one (1) test per lift every 200 feet.

Proctor tests will be required when construction commences, when soil conditions change, and as required by the CQA Officer or RPR.

The Contractor shall secure the services of a qualified independant testing firm to provide the required compaction testing. Test results will be furnished to the CQA Officer and shall be certified by a licensed engineer.

4. Disinfection

A. General

Disinfection of new water mains and fixtures will be the obligation of the Contractor in charge of the installation. The Contractor will sterilize the water main according to the Utilities recommendation, which are as follows:

B. Flushing

After completing the new main installation, it shall be flushed with water of sufficient velocity (minimum 10 ft. per sec.) to remove all dirt and other foreign material and a pressure and leakage test run. (See Standard Procedure No. 1) To determine approximate flow for flushing, assume an average flow from a 2 1/2" nozzle of a hydrant will be approximately 1,000 gallons per minute - from a 4 1/2" nozzle approximately 2,500 gallons per minute. Normally a hydrant will be located

20 feet or less from the end of the main. If no hydrant is within 20 feet of the end of the main a 2" or larger tap shall be installed in the plug at the end of the main.

C. Disinfecting

When this process has been completed, a properly adjusted calcium hypochlorite solution will be injected into the main with the use of a hypochlorinator. The chlorine will be fed at a constant rate into the new main to obtain a residual concentration of not less than 50 mg/l. (50 PPM). The chlorine residual should be checked at intervals to insure that the proper level is maintained. Chlorine application should continue until the entire main is filled with water having a minimum 50 mg/l (50 PPM) residual. The water should remain in the main for a minimum of 24 hours, during which time all valves, hydrants, etc. along the main must be operated to insure their proper disinfection. After flushing the new mains out to reduce the chlorine residual below 1 mg/l (1 PPM), a bacteriological test as prescribed by the Utility shall be taken, (3 satisfactory tests on samples taken 24 hours apart). If the results fail to meet this minimum standard, the disinfecting procedure must be repeated and the results again tested before placing the main in service.

D. Disinfection: Alternate Method

Contractor may elect to insert the proper amount of calcium hypochlorite in each length of pipe as it is laid. If pipe is carefully handled and kept clean during laying this method will normally give satisfactory results. Several cautions must be observed. First; when filling the pipe initially the water must be introduced slowly to keep the calcium hypochlorite from being flushed to the end of the main. Second; the chlorinated solution must be left in the main a minimum of 72 hours. During this 72 hours all valves, hydrants, etc. along the main must be operated to insure their proper disinfection and to remove all air from the line. The pressure and leakage test (Std. Procedure No. 1) may be run at any time after the air has been expelled from the line. At the end of the 72 hour (or longer) period the main must be flushed as described in paragraph 2 until the chlorine residual has been reduced below 1 PPM. Then bacteriological tests as outlines in paragraph 3 shall be taken. If tests do not prove satisfactory it will then be necessary to again disinfect the main using the procedure set forth in paragraph 3.

5.0 Fire Pump Testing

A field acceptance performance test shall be conducted upon completion of pump installation. The test shall be conducted as recommended in NFPA Pamphlet 20, and shall be observed and verified by the CQA Officer with certified documentation provided by the contractor or manufacturer to the OWNER.

1. Field Acceptance Tests.

- A. The acceptance test of the pump installation shall be the responsibility of the installing contractor. The pump manufacturer or his representative shall be present for the acceptance test.
- B. The City of Elkhart shall be notified as to time and place of the field acceptance test, and shall furnish a representative for observing the test.
- C. A copy of the manufacturer's certified pump test characteristic curve shall be available for comparison of results of field acceptance test. The fire pump as installed shall equal the performance as indicated on the manufacturer's certified shop test characteristic curve within the accuracy limits of the test equipment.
- D. The fire pump shall perform at minimum, rated and peak loads without objectionable overheating of any component.
- E. Vibrations of the fire pump assembly shall not be of a magnitude to warrant potential damage to any fire pump component.

6.0 Chlorination System

- A. The vendor supplying the chlorination system package will provide a factory trained technician to oversee or perform the installation of the specified equipment.
- B. The vendor's technician will also provide start up service and training to the owner for system operation.
- C. All equipment provided for the chlorination system shall be tested, and calibrated with certifications provided to the owner upon activation.
- D. Plumbing and pipe fitting associated with chlorination system will be subject to state and local permits and pertinent inspections and approvals by the Elkhart County Building Department.

- E. The Contractor shall request all local inspections as required above and will notify the required observers of the time and date of testing.

7.0 Fire Pump Building

- A. The referenced building and associated design drawings are subject to the Uniform Building Code with Indiana Amendments with plan review and permits provided by the Indiana Department of Fire and Building Safety.
- B. The Elkhart County Building Department will issue a local building permit and will provide inspections insuring compliance with local codes and project plan concept.
- C. The architect or CQA Officer shall provide field review of the building construction as required by Indiana Fire and Building Safety with the minimum inspection as follows

- a. Foundation

- Required before backfill of foundation structure

- b. Framing

- Require before interior wall treatment commences.

- c. Final

- For substantial completion and certificate of occupancy.

- D. The building pad and footing trenches shall be prepared as per the project specifications. Compaction testing shall be required with results certified by a licensed engineer and provided to the CQA Officer.

- Tests shall be performed by a qualified independent testing firm whose services will be secured by the Contractor.

- Building sub-base compaction shall meet or exceed the requirements of a 95% modified proctor density.

- * Test Frequency

- 1 test in each footing trench

- 1 test for every 8" max. lift of building sub-base.

- E. The contractor shall request all local inspections required above and shall provide proper notice to the architect or CQA Officer for field review.

8.0 Monitoring Systems

- A. The vendor supplying the monitoring system package will provide a factory trained technician to oversee or perform the installation of the specified equipment.
- B. The vendors technician will also provide start up service and training to the owner for system operation.
- C. All equipment provided for the monitoring system shall be tested, and calibrated with certifications provided to the owner upon activation. Testing shall insure compatibility with the City of Elkhart existing telemetry monitoring system.
- D. Electrical installations associated with the monitoring system will be subject to state and local permits and pertinent inspections and approvals by the Elkhart County Building Department.
- E. The Contractor shall request all local inspections as required above and will notify the required observers of the time and date of testing.

9.0 Fire Pump Building Electrical System.

- A. The referenced building electrical system and associated design drawings are subject to the National Electrical Code with plan review and permits provided by the Indiana Department of Fire and Building Safety.
- B. The Elkhart County Building Department will issue a local building permit and will provide inspections insuring compliance with local codes and project plan concept.

10.0 Concrete Testing

The Contractor shall employ the services of a qualified independent testing firm to perform the testing as noted below, and shall be performed in the presence of the CQA Officer or RPR.

- A. Three (3) Concrete cylinder samples for each days prior or each 50 cube yards of concrete which ever occurs more often.
- B. One (1) additional test cylinder will be taken during cold weather concreting and be cured on job site under same conditions as concrete it represents.

- C. One (1) slump test will be taken for each set of test cylinders taken. Additional slump tests will be taken if water is added. The slump shall be 4½" inches maximum.

11.0 Water Well Abandonment

As noted in the project specifications, private water well abandonment shall be done in accordance with 310 IAC 16-10-2 of the Indiana Administrative Code. Inspection of this work will be performed by the local Health Department, in Elkhart and St. Joseph Counties. Abandoned wells will be cataloged by address and owner's name with notification in writing supplied to the Indiana Department of Natural Resources.

12.0 Water Service Connections

- A. Water service taps shall be in accordance with the project specifications. Installation of taps, service lines, curb stops, private service leads, meter and remote readers shall be inspected by the CQA Officer or RPR. Inspection and approval guidance will be provided by a qualified technician from the City of Elkhart for the first six installations with the balance performed by the RPR.
- B. Interior plumbing alterations will be performed by, or under the supervision of, an Indiana licensed plumber. Permits from local building departments will be required. For users in St. Joseph County, inspection will be provided by the St. Joseph County Building Department with approval tags affixed to the work when the complete installation complies with state and local codes pertaining to the work. In Elkhart County, inspection will be provided by the CQA Officer or RPR. Code compliance affidavits will be catalogued and filed with the Elkhart County Building Department when the work is complete.
- C. General trenching, installation, backfill and restoration requirements as presented in the project specifications, shall apply to the work with special attention given to the avoidance of existing private improvements. Trees, plantings, landscaping, exterior concrete, paved drives, and underground utilities shall be restored to like or better condition. Foundation penetrations shall be repaired or patched in a workman like manner and will be approved by the CQA Officer or RPR.

Pressure reducing devices will be installed where required. The RPR will inspect the existing water well pump installation and record the pressure gauge reading for each user. If expected pressures produced by the municipal service supply exceed that which is recorded at the time of this inspection, the RPR, at his discretion, will recommend a pressure reducing device and will record his recommendation and supply the CONTRACTOR with a copy of the inspection report or a listing of users where the devices will be required.

D. No entry, upon, or over private property or to the interior of any private dwelling, business or structure of any kind by the contractor, subcontractor, CQA officer or RPR shall be permitted before a signed temporary access agreement with the property owner has been executed and placed on file with CQA Officer. The owner (Conrail) or the owners agent shall negotiate and execute the agreement and provide copies to the CONTRACTOR and CQA Officer. The CQA Officer shall maintain a complete file for each user in this regard and keep a copy of the executed agreement at the job site office for reference. Upon completion of the project, these completed files shall be provided to the owner. A copy of a draft agreement follows.

DRAFT

TEMPORARY EASEMENT AGREEMENT

THIS AGREEMENT is made and entered into this _____ day of _____, 1994, by and between _____, hereinafter referred to as "Homeowner," and CONSOLIDATED RAIL CORPORATION, hereinafter referred to as "Conrail."

RECITALS

The parties recite and declare:

A. Homeowner is the owner of certain real property at the address

_____, and more fully described as follows:

B. Homeowner wants to have underground water lines placed on his above-described real property.

C. Homeowner wants to receive potable water from a public water supply.

D. Homeowner wants to have a water meter installed within his building/house as part of the public water supply.

E. Homeowner wants to have the potable water delivery piping within his building/house relocated and modified in order to connect it to the new potable water piping from the public water supply.

F. Homeowner wants to have an existing water pump and well disconnected from the potable water distribution piping within his building/house, as required by the Indiana DEM and EPA.

G. Homeowner wants to have his existing water supply well abandoned and sealed, in accordance with the requirements of the Indiana Department of Natural Resources and U.S.E.P.A..

H. Conrail and/or its contractors are qualified and willing to perform the installation of the water lines desired by the Homeowner.

I. Conrail is directed to provide a public potable water supply to Homeowner's property, and to abandon and seal the water supply well on Homeowner's property, under an order issued by the Government of the United States of America.

J. In consideration of the above recitals and the mutual covenants contained in this Agreement, Homeowner and Conrail agree to follow:

1. **Grant of Easement.** Homeowner grants to Conrail (including its contractors, subcontractors, agents, employees, successors, and assigns) an easement to use and occupy his real property temporarily, during the construction of underground water lines, water service connection, water meter installation, plumbing revisions, and pump and well abandonment. Conrail is permitted to enter upon Homeowner's real property, make necessary excavations, lay water lines, seal the existing well, and abandon the existing water supply piping. In addition, Conrail is permitted to enter any building for the purpose of attaching meter lines to the public water supply, installing a water meter, and relocating and modifying the potable water piping within the building. Conrail also has the right to store temporarily all necessary equipment, materials and excavated earth on the Homeowner's property.

2. **Underground Facilities.** Homeowner will provide Conrail with information about the location of underground utilities, telephone cables, electric lines, gas lines, sprinkler systems, and any other underground facility located on the property. Conrail will try to lay new underground

pipelines at convenient locations, and where the pipelines will not disturb surface improvements, pavements, plantings and trees.

3. Facilities In Building/Houses. Homeowner will provide Conrail with information about the location of potable water piping, pumps and related plumbing facilities within the building/house to be served. Homeowner will expose or allow Conrail to expose all facilities and piping necessary in order to install potable water service and relocate or modify the potable water system within the building/house.

4. Indemnification. Homeowner will indemnify and hold harmless Conrail against any and all liability or expense which may occur to Homeowner's real property and/or any permanent building, driveway, fence, or other appurtenance, including any underground facility referred to in paragraph 2, during the course of the installation of water lines. However, Homeowner does not indemnify Conrail against any liability or expense caused by Conrail's negligent or tortious act or omission.

5. Condition of Property

a. Following the installation of the water lines, water meter, piping relocation or modification and well abandonment, Conrail will be responsible for re-moving from the property all debris, surplus material, and construction equipment.

b. Surplus excavated earth will be mounded over the trench or used for filling and leveling on the premises, or hauled away, at the Homeowner's option.

c. Conrail will not be responsible for any decorative landscaping or flower beds or bushes on the Homeowner's real property

d. Conrail will repair, reconstruct, or replace any sections of fences or walls removed for access and construction on Homeowner's real property. Conrail will attempt to match existing colors, conditions and materials to Homeowner's satisfaction.

e. Conrail will patch/repair all pavement damages caused by its work on Homeowner's real property.

f. In general, Conrail shall restore all disturbed areas to like or better condition.

6. **Termination.** The easement granted by this Agreement for temporary construction use of portions of the property shall cease and terminate immediately following completion of construction, final inspection, inspection of the waterlines, and performance by Conrail of the conditions and covenants set out in this Agreement.

7. **Binding Agreement.** This Agreement shall bind and inure to the benefit of the respective parties, their contractors, subcontractors, agents, employees, heirs, personal representatives, successors, and assigns of the parties.

8. **Governing Law.** It is agreed that this Agreement shall be governed by, construed, and enforced with the laws of the State of Indiana.

9. **Entire Agreement.** This Agreement shall constitute the entire agreement between the parties. Any prior understanding or representation of any kind preceding the date of this Agreement shall not be binding upon either party, to the extent incorporated in this Agreement.

10. **Modification of Agreement.** Any modification of this Agreement or additional obligation assumed by either party in connection with this Agreement will be binding only if made in writing and signed by each party or an authorized representative of each party.

11. **Paragraph Headings.** The titles to the paragraphs of this Agreement are solely for the convenience of the parties, and shall not be used to explain or modify the provisions of the Agreement.

IN WITNESS WHEREOF, each party of this Agreement has executed it at _____, Indiana, on the day and year written above.

CONSOLIDATED RAIL CORPORATION _____

Homeowner

By: _____

By: _____

Its: _____

Its: _____

ACKNOWLEDGEMENT

COUNTY OF _____) SS:
STATE OF INDIANA)

Before me, a Notary Public in and for said County and State, this _____ day of _____, 1994, personally appeared _____ and acknowledged the execution of the above easement to be their voluntary act and deed.

WITNESS my hand and notarial seal.

_____, Notary Public

Residing in Elkhart County

State of Indiana

My Commission Expires:

PART 6

PROJECT COMPLIANCE INSPECTIONS

1. Prefinal Inspection

Upon substantial completion of construction, the United States Environmental Protection Agency (U.S.E.P.A.) shall be notified for the purposes of conducting a pre-final inspection. This inspection shall consist of a walk-through inspection of the entire project site. The inspection is to determine whether the project is complete and consistent with the contract documents, the administrative order, and the Statement of Work. Any outstanding construction items shall be identified and noted.

2. Final Inspection

Upon the completion of any outstanding construction items identified in the pre-final inspection, the operator shall notify the U.S.E.P.A. for the purposes of conducting a final inspection. The final inspection shall consist of a walk through inspection of the project site. The pre-final inspection report shall be used as a check-list with the final inspection focusing on the outstanding construction items identified in the pre-final inspection. The resolution of the outstanding items shall be confirmed.

PART 7

DOCUMENTATION

1. Construction Daily Report

A summary report shall be prepared by the CQA Officer, or under the direct supervision of the CQA Officer, and by RPR's for each day of on-site observation activity. These shall contain the following information:

- * Date, project name, and report preparer's name.
- * The time at which states and ends, also identify the duration and reason for any work stoppages (i.e. weather delay, equipment shortage, labor shortage, unanticipated conditions encountered, etc.).
- * Data on weather conditions, including temperature, cloud cover, and precipitation.
- * The construction contractors work force, the types of equipment in use.
- * Chronological description of work in progress, including locations and types of work performed.
- * Summary of any meetings held and the names of attendees.
- * A description of all materials used and references or results of testing and documentation.
- * Discussion of any problems/deficiencies identified and any corrective actions taken.

An example of a Daily Construction report is provided as Figure 1.

2. Change Order

A change order report shall be prepared by the CQA Officer or the Design Engineer whenever changes are required in the specifications, contract quantities, contract price, site conditions, or contract time. These reports shall contain the following information:

- * Order number, date, project name
- * Owner of project, contractor
- * Changes made to contract documents and justification
- * Change to contract price, original contract price and current contract price
- * Change in contract amount due to change order
- * New contract price
- * Change in contract time due to change order
- * Date of completion of work
- * All required signatures

An example change order is provided as Figure 2.

3. Partial Payment Estimate

A partial payment estimate shall be provided by the CONTRACTOR for review by the ENGINEER before payment is made by the owner. These payment estimates shall contain the following information:

- * Partial payment estimate number, date, project name
- * Owner of project, contractor

- * Item number, description
- * Original quantity and any revisions because of change orders and change order number
- * Unit of measurement and unit price
- * Quantity of item this estimate
- * Quantity of item total to date
- * Amount earned, amount retained, previous payments and amount due
- * Estimated percentage of job completed
- * Section for CONTRACTOR, ENGINEER and owner to sign

An example partial payment estimate is provided as Figures 3 and 4.

4. Test Reports

A. Concrete Test Reports

Concrete test reports shall be provided to the CQA Officer by the CONTRACTORS independent qualified testing firm. These concrete test reports shall contain the following information:

- * Date, project name
- * Owner of project, contractor
- * Specified strength, cubic yards placed, time batched, weather, supplier, location of placement.
- * Field test results
- * Cylinder loads and strengths

An example concrete test report is provided as Figure 5.

B. Compaction Test Report

Compaction test reports shall be provided to the CQA Officer by the CONTRACTOR's independent qualified testing firm. These compaction test reports shall contain the following information:

- * Date, project name
- * Owner of project, contractor
- * Type of material, location of material
- * Method of compaction
- * Specification requirements
- * Field test method
- * Moisture density test performed and results
- * Field test results including dry density, moisture content, lab soil number, percent compaction, pass or failure of test and location of test

An example compaction test report is provided as Figure 6.

CHANGE ORDER	
ORDER NO. _____	
DATE: _____	
NAME OF PROJECT:	
OWNER:	
CONTRACTOR:	
The following changes are hereby made to the CONTRACT DOCUMENTS:	
Justification:	
Change to CONTRACT PRICE:	
Original CONTRACT PRICE \$ _____	
Current CONTRACT PRICE adjusted by previous CHANGE ORDER \$ _____	
The CONTRACT PRICE due to this CHANGE ORDER will be	
(increased) (decreased) by \$ _____	
The new CONTRACT PRICE including this CHANGE ORDER will be \$ _____	
Change to CONTRACT TIME:	
The CONTRACT TIME will be (increased) (decreased) by _____ calendar days.	
The date for completion of all work will be _____ (Date).	
Requested By:	
Recommended By:	
Accepted By:	

FIGURE 2

[illegible]

FIGURE 3

PARTIAL PAYMENT ESTIMATE										
DATE:							OWNER:			
NAME OF PROJECT:							CONTRACTOR:			
PARTIAL PAYMENT ESTIMATE NO.							PAGE OF			
EXTRAS TO CONTRACT										
ITEM NO.	CONTRACT ITEMS						THIS PERIOD		TOTAL TO DATE	
	DESCRIPTION	ORIGINAL QUANTITY	REVISED QUANTITY	CHANGE ORDER NO.	UNIT	UNIT PRICE	QUANTITY	AMOUNT	QUANTITY	AMOUNT
AMOUNT		THIS PERIOD					TOTAL TO DATE			
AMOUNT EARNED										
AMOUNT RETAINED										
PREVIOUS PAYMENTS										
AMOUNT DUE										
ESTIMATED PERCENTAGE OF JOB COMPLETED %										
I hereby certify that I have carefully inspected the work and as a result of my inspection and to the best of my knowledge and belief, the quantities shown in this estimate are correct and have not been shown in previous estimates and the work has been performed in accordance with the contract documents.										
CONTRACTOR:					ENGINEER:			OWNER:		
TITLE:					TITLE:			TITLE:		

FIGURE 4

CONCRETE TEST REPORT

PROJECT: _____

CLIENT: _____ DATE: _____

GEN. CONTRACTOR: _____ SET NO.: _____ PROJECT NO.: _____

SPECIFIED STRENGTH: _____ PSI TTL. YDG. EMPLACED: _____ CU. YD. TIME BATCHED: _____

WEATHER: _____ AIR T: _____ F SUPPLIER: _____

LOCATION OF PLACEMENT: _____

MIX DATA

MIX: _____

CEMENT: _____ LB. SACKS/CU.YD.: _____ WATER RED.: _____ AMT.: _____

FINE AGG.: _____ LB. TYPE: _____ ACCEL/RET.: _____ AMT.: _____

COARSE AGG.: _____ LB. TYPE: _____ OTHER ADMIXT.: _____ AMT.: _____

WATER: _____ LB. GAL.: _____ _____ AMT.: _____

_____ AMT.: _____

TEST	TICKET NO.	TRUCK NO.	SPECIFIC LOC.	CUM. YARD	TIME SAMPLED	SLUMP	% AIR	UNIT WEIGHT	YIELD	MIX TEMP.	WATER ADDED	REMARKS
1												
2												
3												
4												
5												
6												
7												
8												

CYLINDER NO.	SPECIMEN MARKING	DATE MOULDED	DATE RECEIVED	DATE TESTED	AGE AT TEST IN DAYS	TOTAL LOAD.LBS.	PSI

NOTES: _____

SINCERELY: _____

THANK YOU FOR YOUR BUSINESS

FIGURE 5

COMPACTION TEST REPORT
THE FOLLOWING TESTS ARE MADE IN ACCORDANCE
WITH ASTM, AASHTO, OR INDOT PROCEDURES

CLIENT:

DATE:

PROJECT:

CONTRACTOR:

TYPE OF MATERIAL	LOCATION OF MATERIAL	METHOD OF COMPACTION
SAND _____	FOOTING/PAD SUBGRADE _____	VIBRATING PLATE _____
SILT _____	FLOOR SUBGRADE _____	VIBRATING ROLLER _____
CLAY _____	FILL _____	JUMPING JACK _____
GRAVEL _____	BACKFILL _____	HOE PACK _____
STONE _____	SUBBASE _____	RUBBER-TIRE ROLLER _____
SLAG _____	BASE COURSE _____	SHEEP'S FOOT ROLLER _____
OTHER _____	OTHER _____	OTHER _____

SPECIFICATION REQUIREMENTS:	_____	STANDARD PROCTOR (ASTM D698)
(% OF MAXIMUM DENSITY)	_____	MODIFIED PROCTOR (ASTM D1557)
	_____	OTHER

FIELD TEST METHOD:	_____	TROXLER NUCLEAR DENSITY GAUGE
	_____	(ASTM D2922, D3017)
	_____	SAND CONE (ASTM D1556)
	_____	RUBBER BALLOON (ASTM D1568)

MOISTURE DENSITY TEST	_____	STANDARD PROCTOR (ASTM D698)
PERFORMED :	_____	MODIFIED PROCTOR (ASTM D1557)
	_____	MDOT CONE

MOISTURE DENSITY RESULTS:	
LAB SOIL No.	_____
MAXIMUM DENSITY (P.C.F)	_____
FIELD MOISTURE (%)	_____
OPTIMUM MOISTURE (%)	_____

FIELD TEST NO.	DATE OF TEST	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)	LAB SOIL No.	PERCENT COMPACTION	PASS OR FAIL	LOCATION

REMARKS: _____

CC: () CLIENT

THANK YOU FOR YOUR BUSINESS SINCERELY: _____

FIGURE 6

7.0 HEALTH AND SAFETY PLAN

The attached plan provides general requirements for the health and safety of project related staff and the public during the construction phase of the project, including roles and responsibilities, contractor requirements, construction safety guidelines and general emergency procedures. It is intended that this plan would pertain to the engineering field staff and would become a part of an overall project health and safety plan developed under the groundwater remediation portion of the project by the Groundwater Technology, Inc.

CONSOLIDATED RAIL CORPORATION

2001 MARKET STREET
PHILADELPHIA, PA

Health & Safety Plan

Water Main Extension

And

Groundwater Extraction System Force Main

& Discharge Force Main

March 1994

As Prepared By:

Wightman Petrie, Inc.
2340 Cassopolis Street
Elkhart, IN 46514
Telephone: 219-264-4587

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PART 1

PURPOSE AND SCOPE

The purpose of the Health and Safety Plan is to address safety issues associated with the construction activities of the municipal water main extension and the groundwater extraction system force main and discharge force main. The plan identifies potential hazards that these activities may present to construction-site personnel, visitors, trespassers, and to nearby residents, and describes how identified hazards will be controlled.

HSP-1

PART 2

ROLES AND RESPONSIBILITIES

1. Owner and Operator

Consolidated Rail Corporation (Conrail) is the owner of the project and will operate all remedial systems once constructed.

2. Design Engineer

The engineer of record representing the owner in regard to the U.S. E.P.A order is:

Groundwater Technology Inc.
3 Edgewater Drive
Norwood, MA 02062

The engineer providing design in regard to this project is

Wightman Petrie, Inc
2340 Cassopolis Street
Elkhart, Indiana 46514

3. Contractors

Contractors and equipment suppliers will be selected via the competitive bid process. Following completions of the project documents and their approval by the EPA.

4. On-Site Health and Safety Representative

Each individual company is responsible for their own employees' health and safety and shall designate a site Health and Safety Representative (HSR). The HSR shall be responsible for implementing safety procedures, conducting or participating in safety meetings (prior to the start of work and on-going), and completing health and safety reports when required.

PART 3
CONSTRUCTION SAFETY

1. Hazard Assessment

A. Physical Hazards

Physical hazards that may be present during on-site activities include the following:

- * Noise - present from equipment, tools, or operations
- * Cold stress- if temperatures are below 20F as measured on the wind-chill chart.
- * Traffic - in all areas where the work site is adjacent to public roadways
- * Utilities - underground and overhead
- * Electrical
- * Excavations - during pipe laying
- * Equipment operations
- * Falls
- * Materials handling

2. Job Site Safety Practices

The following job site safety practices have been condensed from the OSHA Safety and Health Standards Digest-Construction Industry.

A. General Requirements

- a. Each employer shall initiate and maintain programs to provide for frequent and regular inspections of the job site, materials, and equipment.
- b. Each employer shall instruct their employees in the recognition and avoidance of unsafe conditions and in the regulations applicable to their work environment to control or eliminate hazards or other exposure to illness or injury.
- c. The use of any machinery, tools, material, or equipment which is not in compliance with the applicable requirements shall be prohibited.
- d. Each employer shall maintain knowledge of Construction site safety requirements.

B. Hazard Communication

- a. The purpose of the hazard communication standard is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. Transmitting information is accomplished by means of comprehensive hazard communication programs, which include container labeling and other forms of warning, material safety data sheets, and employee training.
- b. Employers shall develop, implement, and maintain a written hazard communication program for their workplaces. Employers shall inform their employees of the availability of the program, including the required list(s) of hazardous chemicals and the required material safety data sheets.
- c. The employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged, or marked with the identity of the hazardous chemical(s) and that it shows hazard warnings appropriate for employee protection.
- d. Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet for each hazardous chemical they use.
- e. Employers shall provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area. employers shall also provide employees with information on any operations in their work area where hazardous chemicals are present; and the location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals and the required material safety data sheets.

C. Head Protection

- a. Hard hats shall be worn in areas where there is a possible danger of head injuries from impact, flying or falling objects, or electrical shock and burns.
- b. Hard hats for protection against impact and penetration of falling and flying objects shall meet the requirements of ANSI Z89.1-1969.
- c. Hard hats for protection against electrical shocks and burns shall meet the requirements of ANSI Z89.2-1971.

D. Hearing Protection

- a. Feasible engineering or administrative controls shall be used to protect employees against sound levels in excess of those shown in the following table.
- b. When engineering or administrative controls fail to reduce sound levels within the limits, hearing protection shall be provided and used.
- c. Exposure to impulse or impact noise shall not exceed 140 dBA peak sound pressure level.
- d. In all cases where the sound levels exceed the limits, a continuing, effective hearing conservation program shall be administered.
- e. Permissible Noise Exposures are as identified below.

<u>Duration per day in hours</u>	<u>dBA Slow Responses</u>
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼	115

E. Drinking Water

- a. An adequate supply of potable water shall provided in all places of employment.
- b. Potable drinking water containers shall be capable of being tightly closed and shall be equipped with a tap.
- c. A common drinking cup shall be prohibited.

F. Housekeeping

- a. Form and scrap lumber with protruding nails and all other debris shall be kept clear from all work areas.

- b. Combustible scrap and debris shall be removed at regular intervals.
- c. Containers shall be provided for collection and separation of all refuse. Covers shall be provided on containers used for flammable or harmful substances.
- d. Wastes shall be disposed at frequent intervals.

G. Respiratory Protection

- a. In emergencies, or when feasible engineering or administrative controls are not effective in controlling toxic substances or contaminant levels, appropriate respiratory protective equipment shall be provided by the employer and shall be used.
- b. Respirators shall be approved by the Mine Safety and Health Administrative/National Institute for Occupational Safety and Health or acceptable to the U.S. Department of Labor for the specific contaminant to which the employee is exposed.
- c. Respirators shall be appropriate for the hazardous material involved and the extent and nature of the work requirements and conditions.
- d. Employees required to use respirators shall be thoroughly trained in their use.
- e. Respirators shall be inspected regularly and maintained in good condition.

H. Eye and Face Protection

- a. Eye and face protection shall be provided when machines or operations present potential eye or face injury.
- b. Eye and face protective equipment shall meet the requirements of ANSI Z87.1-1968, "Practice for Occupational and Educational Eye and Face Protection."
- c. Filter lenses or plates of at least the proper shade number employees involved in welding operations.

I. Fire Protection

- a. A firefighting program shall be followed throughout all phases of the construction work involved. It shall provide for effective firefighting

equipment to be available without delay, and shall be designed to effectively meet all fire hazards as they occur.

- b. Firefighting equipment shall be conspicuously located and readily accessible at all times, periodically inspected, and maintained in operating condition.
- c. Carbon tetrachloride and other toxic vaporizing liquid fire extinguisher shall be prohibited.
- d. The employer shall establish an alarm system at the work site so that employees and the local fire department can be alerted of an emergency.

J. Medical Services and First Aid

- a. Each employer shall ensure the availability of medical personnel for advice and consultation on matters of occupational health.
- b. When a medical facility is not reasonably accessible for the treatment of injured employees, a person trained to render first aid shall be available at the work site.
- c. First aid supplies approved by the consulting physician shall be readily available.
- d. The telephone numbers of the physicians, hospitals, or ambulances shall be conspicuously posted.

K. Flaggers and Traffic Warning

- a. When working in the right-of-way of terminal roads, signs shall be provided and used in accordance with requirements with the Manual on Uniform Traffic Control Devices.
- b. When signs, signals, and barricades do not provide necessary protection on or adjacent to terminal roads, flaggers or other appropriate traffic controls shall be provided.
- c. Flaggers shall be provided with and shall wear a red or orange warning garment while flagging. Warning garments worn at night shall be of reflectorized material.

L. Ladders

- a. The use of ladders with broken or missing rungs or steps, broken or split side-rails, or with other faulty or defective construction shall be prohibited. When ladders with such defects are discovered, they shall be withdrawn from service immediately.
- b. Portable ladders shall be placed on a substantial base at a 4:1 pitch, and shall have clear access at the top and bottom, shall extend a minimum of 36 inches above the landing, or where not practical, shall be provided with grab rails and be secured against movement while in use.
- c. Portable metal ladders shall not be used for electrical work or where they may contact electrical conductors.
- d. Job-made ladders shall be constructed for their intended use. Cleats shall be inset into side rails ½ inch, or filler blocks shall be used. Cleats shall be uniformly spaced at 12 inches, top-to-top.
- e. Except where either permanent or temporary stairways, or suitable ramps or runways are provided, ladders shall be used to give safe access to all elevations.

M. Excavating and Trenching

- a. Before opening any excavation, the contractor shall contact utility company representatives to determine if there are underground utilities installations in the area, and they shall be located and supported during the excavation operations.
- b. The walls and faces of trenches 4 feet or more deep and all excavations, in which employees are exposed to danger from moving ground or cave-in, shall be guarded by a shoring system, sloping of the ground, or some other equivalent means.
- c. In excavations which employees may be required to enter, excavated or other material shall be effectively stored and retained at least 2 feet or more from the edge of the excavation.
- d. Daily inspections of excavations shall be made by a competent person. If evidence of possible cave-ins or slides is apparent, all work in the excavation shall cease until the necessary precautions have been taken to safeguard the employees.

3. Emergency Procedures

If an emergency develops at the site, the discoverer shall take the following course of action:

- * Notify the proper emergency services (fire, police, ambulance, etc.) for assistance.
- * Notify other affected personnel at the site.
- * Contact affected companies and the owner to inform them of the incident as soon as possible.
- * Prepare a summary report of the incident for affected companies and the owner.

Emergency contacts and telephone numbers are as follows:

<u>Owner Contact:</u>	Tom Pendergast	(219)209-1688
<u>Poison Control Center:</u>	Indiana Poison Center	(800)382-9097
<u>Elkhart County Ambulance:</u>		(219)523-3315
<u>Hospital Emergency Room:</u>	Elkhart General Hospital	(219)523-3315
<u>Police:</u>	City of Elkhart Elkhart County Sheriff	(219)295-7070 (219)533-4151
<u>Fire Department:</u>	Baugo Township	(219)293-0780

The emergency route to the Elkhart General Hospital:

Go East to State Road 19 (Nappanee Street) turn North (left) on Nappanee Street, cross the river, turn right on Rainbow Bend until it dead ends at West Blvd, turn right on West Blvd, go one block turn left on Clinton Street to the hospital.

St Joseph County:

<u>Ambulance:</u>	St. Joseph County-Community EMS	(219)289-5736
<u>Hospital Emergency Room</u>	Memorial Hospital	(219)234-9041 (219)284-7458 (Trauma)
<u>Police:</u>	South Bend St. Joseph County Sheriff	(219)284-9361 (219)284-9611
<u>Fire Department:</u>	Penn Township	911

The emergency route to the Memorial Hospital:

Memorial Hospital
615 N. Michigan
South Bend, Indiana

Go West on US 33 to US 31. Turn North on to US 31 to the hospital.

* Elkhart General Hospital is the closest facility to the project site. It is expected that emergency personal responding to project related injuries will transport to the nearest facility with trauma care capabilities.

HSP-11

8.0 OPERATION AND MAINTENANCE MANUAL

The following information includes operation and maintenance practices for the proposed municipal water distribution system. As per the U.S.E.P.A. R.O.D., the water system is required to be operated and maintained by Conrail for the first one year period. Preliminary agreements with the City of Elkhart include provisions for the City to assume this responsibility under contract agreement with Conrail and at Conrail's cost. After this first year, the system will become a fully dedicated City owned improvement with future operation and maintenance incorporated into the City's program.

The facilities incorporated in the Conrail constructed water system are to be similar to those existing in the City of Elkhart system. Accordingly, the Operation and Maintenance practices described herein are intended to duplicate those currently used by the City of Elkhart.

CONSOLIDATED RAIL CORPORATION

2001 MARKET STREET
PHILADELPHIA, PA

Operation and Maintenance Manual

Conrail-Elkhart Yard Municipal

Water Main Extension

March 1994

As Prepared By:

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PART 1

PURPOSE & SCOPE

The following operation and maintenance manual outlines practices used to preserve the operating integrity and prolong the life of the proposed water system and its components. Procedures are provided for cleaning the water main, and disinfecting the system after repairs. Managements plans for maintenance are delineated for fire hydrants, and valves. Operating processes are also given for the chlorination system and the fire pump station located within the system. Sections dedicated to record keeping include example forms used to keep the system and operation records up to date and functioning. An operation and maintenance quality assurance plan section is also included as part of this manual.

The guidelines were developed utilizing the American Water Works Association "Manual of Water Supply Practices, Installation, Field Testing, and Maintenance of Fire Hydrants" (AWWA M17) Third Addition and the AWWA manual "Distribution System Maintenance Techniques." Additional AWWA publications used for reference were "Basic Level Water Treatment Operator's Practices" and "Water Chlorination Principles and Practices." This manual also incorporates City of Elkhart common practices and procedures as related by the City's system operators and engineers. This document and supporting shop drawings supplied for project specific equipment, will be delivered to the City of Elkhart for their use during the one year operational and maintenance period required of Consolidated Rail Corporation by the U.S.E.P.A R.O.D.

A separate operation and maintenance manual will be submitted with the groundwater remediation portion of the project which will provide details for operation and maintenance of the force main improvements previously discussed in this report.

PART 2

WATER MAIN CLEANING

The problems associated with the assurance of in-system water quality mandate that the water works provide water that is free from disease-causing organisms and toxic materials, and is pleasing to the consumer from the standpoint of appearance, taste and odor. Problems in obtaining high-quality water may result from the construction or operation of the distribution system, or problems may arise at the source. Correction and prevention of these problems require that the Water Works plan and implement the necessary programs for continual maintenance of facilities and protection of water quality. Commonly, water mains are cleaned and flushed to improve hydraulic capacity and control or eliminate turbidity, tastes, odor, organisms, and other contamination.

1. Cleaning & Flushing

Before cleaning or flushing any main, provisions should be made to control pressure surges. A sudden stopping of flowing water can occur due to rapid operation of a line valve, or a sudden slowing or stopping of a pig or swabs. Such surges can raise system pressure and these types of surges can be destructive to water mains and appurtenances.

Operational practices must be implemented that will protect in-system water quality. Records must be accurately maintained that show data regarding complaints of water quality and pressure.

Routine flushing programs can be determined by considering the seriousness and frequency of complaints, location within the system, and flushing time required to clean the water. Flushing will be done at semiannual intervals. Non routine flushing will be required when routine flushing does not eliminate the problem. Some portions of the water system may have to be cleaned, flushed and disinfected.

All cleaning and flushing operations should be recorded accurately. These records will permit monitoring of the operation, evaluation of its effectiveness, aid in determining the source of the problems, and track preventive actions to be scheduled in the future.

Initial procedures and thorough planning should precede actual cleaning or flushing. A summary of initial procedures needed prior to beginning of operations follows:

- A. Preplan and map the cleaning or flushing of a main or section of the water system.
- B. Determine the order of work, source of water, entry and exit points.

- C. Determine vehicles, size of crew, equipment, and materials that will be required.
- D. Verify that valves and hydrants are operable.
- E. Notify customers of the date and time the system will be out of service.
- F. Notify other utilities and agencies needing to know of the planned operation.
- G. Determine and implement required safety precautions.

2. Flushing

The maintenance or improvement of in-system water quality is the primary goal of flushing. It is used to eliminate materials that are hazardous or cause complaints, to clean newly installed or repaired mains, and to remove impurities as they occur or accumulate.

A general flushing procedure is as follows:

- A. Verify that the initial procedures have been completed.
- B. Determine adequacy of water supply, pressure, and flow rate of flushing water. It will need to flush at least at 2 ½ fps and may need to flush as high as 12 fps to move sand in inverted siphons (Table 2-1).
- C. Consider the time of day for flushing. It may be necessary to flush at night when there is less congestion. This also has advantages of probable higher pressure and fewer observers.
- D. Alkalize the water system to be sure the flushing will not result in inadequate pressures or flow in other parts of the system.
- E. Keep adequate and accurate records of all operations and events.

Velocity fps (m/s)	PIPE SIZE				
	6 inch	8 inch	10 inch	12 inch	16 inch
	FLOW REQUIRED GPM (L/S)				
2 ½ (0.8)	220 (14)	390 (25)	610 (39)	900 (57)	1575 (99)
12 (3.6)	1075 (68)	1900 (120)	2975 (188)	4300 (271)	7600 (479)

TABLE 2-1

3. Cleaning

When flushing a water main has proven inadequate, it may become necessary to use swabs or pigs. Swabs are used to remove soft scales and loose sediments, while pigs are used to remove encrustation and tuberculation. In addition to the removal of objectionable material from a main, these cleaning devices can sufficiently clean a main to increase its flow and thus reduce operating pressure losses.

A. Swabs.

Swabs are made of polyurethane foam in soft or hard grades, and either cut to size desired or purchased commercially. Swabs are successful in removing slime, soft scales, and loose sediment. They wear quickly in heavily encrusted mains, and will not significantly affect hardened tuberculation. Hard swabs are typically used in new mains and in mains with minor reductions in diameter.

A typical swab cleaning procedure is outlined below.

1. Be sure initial procedures have been completed.
2. Install equipment necessary for entry and exit points for launching and retrieving of swabs.
3. Isolate water main or portion of the system to be cleaned.
4. Open upstream water supply to launch swab.

5. Run swab at 2-5 fps

- a. Estimate flow rate with pilot gauge at exit or meter on inlet supply.
- b. Note entry time and estimate time of exit. If travel time is too long, reverse flow and calculate location of blockage.

6. Make sufficient swab runs so flushing water clears within one minute.

7. Account for all swabs (a typical cleaning operation may take from 10 to 20 swabs).

8. Final flush should run until water is clear of swab particles

9. Keep good records of all operations and events.

B. Pigs

Pigs are made commercially of polyurethane, come in various sizes, are bullet shaped, vary in density, and are available in various grades of flexibility and roughness. Being harder and less flexible than swabs, pigs can be more durable and remove more material.

A number of different types of pigs are available for use in system cleaning. The most commonly used pigs can be classified as bare, cleaning, or scraping pigs.

Bare pigs of high-density foam are sent through a main to determine the true inside diameter of the deposit to be cleaned. Cleaning pigs are bare pigs with a tough coat of polyurethane synthetic rubber applied in a criss-cross pattern. When sent through a main, most types of encrustation and growths will be removed. Scraper pigs will remove most of the harder encrustation and tuberculation. These pigs are cleaning pigs with spirals of silicon carbide or flame-hardened steel-wire brushes.

A pig cleaning procedure is as follows:

1. Be sure initial procedures have been completed.
2. Install equipment necessary for entry and exit points for launching and retrieving pigs. (In many cases, it will be necessary to cut into a water main to install the equipment.)
3. Isolate water main to be cleaned. Make provisions to control surges.
4. Open water supply to launch pig.

5. Control speed of pig with downstream hydrant blow-off valve.
 - a. Typical speeds are 1-5 fps. (See Table 2-2)
 - b. Control pig speed carefully. (Recognize that sudden changes in speed or a stoppage will cause surges in water pressure which, at the higher speeds, can be destructive to the water system.)
6. Final flush should run until water turns clear.
7. Keep good records of all operations and events.

C. Final Procedures.

After cleaning a water main, either by use of swabs or pigs, be sure to complete the following:

1. Flush water main thoroughly, to be sure water is clear.
2. Determine the quality of the water in the main.
 - a. Chlorinate the main before placing in service.
 - b. Flush main thoroughly.
3. Reverse original procedures to place main in service. Carefully check to be sure all valves are again in operating position and all services are activated.

TABLE 2-2

APPROXIMATE PRESSURES AND FLOWS FOR PIGGING							
Nominal Pipe I.D.		Pressure		Liquid Flow		Gaseous Flow	
in.	mm	psig†	kPa (gauge)	gpm‡	L/min	scfm§**	m³/h‡‡
2	50	100-200	690-1380	30-50	113-189	21-56	34-90
3	80	100-150	690-1030	70-100	264-378	46-124	74-199
4	100	75-125	515-860	120-200	454-757	80-215	129-346
6	150	50-100	345-690	250-450	946-1703	182-340	293-547
8	200	30-80	205-550	450-800	1703-3028	316-849	508-1365
10	250	20-60	140-410	750-1250	2838-4731	499-1341	802-2156
12	300	10-50	70-345	1000-1800	3785-6813	715-1921	1150-3089
14	350	10-40	70-275	1400-2500	5299-9463	873-2345	1404-3771
16	400	5-35	35-240	1800-3000	6813-11355	1158-3108	1862-4998
18	450	5-30	35-205	2000-4000	7570-15140	1477-3965	2375-6376
20	500	5-25	35-170	2800-5000	10598-18925	1842-4944	2962-7950
22	550	5-25	35-170	3000-6000	11355-22710	2243-6022	3607-9683
24	600	5-20	35-140	4000-7000	15140-26495	2690-7221	4326-11611
26	660	5-20	35-140	5000-8000	18925-30280	3173-8519	5102-13699
28	710	5-20	35-140	6000-9000	22710-34065	3693-9814	5938-15781
30	750	5-10	35-70	7000-11000	29710-41635	4259-11432	6848-18383
36	900	5-10	35-70	10000-16000	37850-60560	4860-12448	7815-20016
40	1015	5-10	35-70	12000-20000	45420-75700	5140-15422	8265-24799
42	1050	5-10	35-70	13000-22000	49205-83270	5679-17038	9132-27397
48	1200	5-10	35-70	17000-27500	64345-104087	6242-22362	10037-35958
54	1350	5-10	35-70	22000-38000	83270-143830	9733-29192	15651-46941
60	1500	5-10	35-70	26000-42000	98410-158970	11720-35159	18846-56536
72	1800	5-10	35-70	37000-65000	140045-246025	17304-51903	27825-83460

*Volumes and pressures are recommendations only. Not to be considered as absolute requirements. Requirements will vary according to type of pipe, fluid, gas, materials in pipe, viscosity, temperature, etc.
 †psig=differential pressure.
 ‡gpm is based on 3 and 5 fps velocity.
 §scfm is based on 5 fps at approximately 30 psi and 10 fps at approximately 45 psi.
 **Formula for scfm calculation is ft³ x psi (in atmospheres) x fpm. Cubic feet of volume per linear foot of per pipe x atmospheres (14.7 psi) x fpm.
 ††m³/h=scfm x 1.608.

PART 3

DISINFECTION

Disinfecting new water mains before use is always necessary, as well as mains in existing systems that have been repaired are subjected to operational procedures that might cause contamination.

When cutting into or repairing a water main the following procedures will be used:

1. Trench Treatment

When an existing main is opened, either by accident or design, the excavation will likely be wet and may be badly contaminated from nearby sewer. Liberal quantities of hypochlorite applied to open trench areas will lessen the danger from such pollution.

2. Swabbing with Hypochlorite Solution

The interiors of all pipe and fittings (particularly couplings and sleeves) used in making the repair shall be swabbed or sprayed with a hypochlorite solution before they are installed.

3. Disinfecting

When flushing has been completed, a properly adjusted calcium hypochlorite solution will be injected into the main with the use of a hypochlorinator. The chlorine will be fed at a constant rate into the main to obtain a residual concentration of 500 mg/l (500 PPM). The chlorine application should continue until the entire main is filled with water having a minimum 500 mg/l (500 PPM) residual. The water should remain in the main for a minimum of thirty (30) minutes, during which time all valves, hydrants, etc. along the isolated section of main must be operated to insure their proper disinfection. After flushing the main out to reduce the chlorine residual to below 1 mg/l (1 PPM) a bacteriological test shall be taken. If the results fail to meet the 1 mg/l (1 ppm) standard, the disinfecting procedure must be repeated and the results again tested before placing the main in service.

4. Flushing

After completing the repairs, the water main shall be flushed with water of sufficient velocity (minimum 10 feet per second) to remove all dirt and other foreign material. To determine approximate flow for flushing, assume an average flow from a 2½"

nozzle, approximately 2,500 gallons per minute. Flushing shall be started as soon as repairs are made and shall be continued until discolored water is eliminated.

5. Sampling

Bacteriological samples shall be taken after repairs are completed to provide a record for determining the procedures effectiveness. If the direction of flow is unknown, then samples shall be taken on each side of the main break. If unacceptable bacteriological samples are recorded, the disinfecting procedure must be repeated and the results again tested before placing the main in service.

PART 4

VALVES

Valves are an essential part of a water distribution system, they are necessary for system control during emergencies, scheduled repair and system expansion.

Each gate valve should be operated through a full cycle and returned to its normal position on a schedule that is designed to prevent buildup of tuberculation or other deposits that could render the valve inoperable or prevent a tight shut off.

Maintenance should be performed at the time a malfunction is discovered to avoid a return trip to the same valve and to prevent forgetting about it all together. A recording system should be adopted that provides a written record of valve location, condition, maintenance, and each subsequent inspection of the valve.

1. Inspection

Each valve should be operated through one complete operating cycle. If the stem action is tight as a result of "hard-water" build-up on the stem threads, the operation should be repeated several times until the opening and closing actions are smooth and free. With the gate in the partially open position, a visual inspection should be performed, where practical, to check for leakage at all joints, connections, and areas of packing on seals. If leakage is observed, all defective O-rings, seals, gaskets, or end-connection sealing members should be replaced. If the leakage cannot be corrected immediately, the nature of the leakage should be reported promptly to those who are responsible for repairs. If the valve is inoperable or irreparable, its location should be clearly established to prevent loss of time for repair crews.

2. Record Keeping

In order to carry out a meaningful inspection and maintenance program, it is essential that the location, make, type, size and date of installation of each valve be recorded. When a resilient-seated gate valve is inspected, an entry should be made in the permanent record indicating date of inspection and condition of the valve. If repair work is necessary, it should be indicated, and on completion of the work, the nature of the repairs and date completed should be recorded.

3. Repairs

Leakage, broken parts, hard operation, and other major defects should be corrected by a repair crew as soon as possible after the defect has been reported. If repairs are to be performed in the field, the repair crews should take a full complement of spare parts to the job site. Provisions should be made to isolate the defective valve from water

pressure and relieve internal trapped pressure prior to performing any corrective maintenance. Disassembly of the valve should be accomplished in accordance with the procedures supplied by the manufacturer. After repair of the valve, the operating mechanism should be cycled through one complete operating cycle. With full line pressure applied to the valve in the open position, an inspection should be made to detect leakage in the areas around the seal plate, bonnet, packing gland, and body-end connections. A record should be made to indicate that the valve has been repaired and is in working condition. Any markings indicating that the valve is inoperable should be removed.

AWWA Standard C509, Resilient-Seated Gate Valves for Water and Sewerage Systems, and AWWA Standard C600, Standard for Installation of Ductile-Iron Water Mains and their Appurtenances, contain useful information for valve installation and maintenance procedures.

PART 5

FIRE HYDRANTS

The primary purpose of a fire hydrant is fire suppression. However, hydrants also serve other useful functions. For example, hydrants provide a method of testing the distribution systems' flow capabilities. They also provide a means for flushing the system mains, while each of these functions might be of importance, its primary purpose is fire suppression.

Hydrants are occasionally used by unauthorized individuals. When unauthorized use of hydrants becomes a problem, special control techniques may be required. Common control techniques involve legal action and penalties against the offenders and the installation of special operating nuts and nozzle caps that can be operated only with special wrenches.

1. Inspection

All hydrants should be inspected regularly, at least twice a year, to ensure their satisfactory operation. A common technique is to perform one inspection in the fall and another in the spring. It is advisable to inspect all types of hydrants after each use. Dry-barrel hydrants with permanently plugged drains must be pumped out after each use and then inspected. During freezing conditions, after-use inspections are especially important.

Dry-Barrel Hydrant Inspection Procedure

- A. Check the hydrant's appearance. Remove obstructions around it. If paint is needed, either paint the hydrant or schedule it for painting. Check to see whether the hydrant needs to be raised because of a change in the ground-surface grade. If adjustments are needed, schedule the work.
- B. Remove one outlet-nozzle cap and use a listening device to check for main valve leakage.
- C. Using a plumb bob, check for the presence of water or ice in the hydrant barrel.
- D. Replace the outlet-nozzle cap. Leave it loose enough to allow air to escape.
- E. Open the hydrant only a few turns. Allow air to vent from the outlet-nozzle cap.
- F. Tighten the outlet-nozzle cap.

- G. Open the hydrant fully. Check for ease of operation. Certain water conditions may cause hard-water buildup on the stem threads of toggle and slide-gate hydrants and on the threads of wet-top hydrants. Opening and closing the hydrant repeatedly usually removes this buildup. If the hydrant has no threads in the water, but operates with difficulty, check the lubrication before proceeding with the inspection. Other problems that may make operation difficult are stuck packing and bent stems.
- H. With the hydrant fully open, check for leakage at flanges, around outlet nozzles, at packing or seals, and around the operating stem. Repair as needed.
- I. Partially close the hydrant so the drains open and water flows through under pressure for about 10 seconds, flushing the drain outlets.
- J. Close the hydrant completely. Back off the operating nut enough to take pressure off of the thrust bearing or packing.
- K. Remove an outlet-nozzle cap.
- L. Attach a section of fire hose or other deflector to protect the street, traffic, and private property from water expelled at high velocity.
- M. Open the hydrant and flush to remove foreign material from the interior and lead.
- N. Close the hydrant. Remove the deflector and check the operation of the drain valve by placing the palm of one hand over the outlet nozzle. Drainage should be sufficiently rapid to create noticeable suction. For no-drain hydrants, pump the water from the barrel.
- O. Using a listening device, check the main valve for leakage.
- P. Remove all outlet-nozzle caps, clean the threads, check the condition of the gaskets, and lubricate the threads. (Graphite power in oil works well, as do several of the never-seize compounds.) Check the ease of operation of each cap.
- Q. Check outlet-nozzle cap chains or cables for free action on each cap. If the chains or cables bind, open the loop around the cap until they move freely. This will keep the chains or cables from kinking when the cap is removed during an emergency.

- R. Replace the caps. Tighten them, and then back off slightly so they will not be excessively tight. Leave them tight enough to prevent their removal by hand.
- S. Check the lubrication of operating-nut threads. Lubricate per the manufacturer's recommendations.
- T. Locate and exercise the auxiliary valve. Leave it in the open position.
- U. On traffic-model hydrants, check the breakaway device for damage.
- V. If the hydrant is inoperable, tag it with a clearly visible mark and notify the fire department. This may save fire fighters valuable time in an emergency. Schedule the hydrant for repair.

2. Lubrication

For detailed information on how to lubricate a particular hydrant, contact the hydrant's manufacturer. The following general guidelines should be used in conjunction with the manufacturer's recommendations.

- A. Determine if the hydrant uses oil or grease on the operating threads. If the threads are exposed to water, the grease should not be water soluble.
- B. In order to lubricate the threads on toggle-type hydrants, the entire operating mechanism must be removed.
- C. In arctic climates, moisture in the air often will freeze the outlet-nozzle caps and operating nut. A common solution to this problem is to coat the threads and nut with antifreeze. The antifreeze should be made of a nontoxic, noncorrosive compound that is approved by the drinking water authority that has jurisdiction over potable water.

NOTE; Placing antifreeze into the barrel section of the hydrant is not recommended.

3. Repairs

Any condition that cannot be repaired easily during routine inspection should be recorded in the inspection report. The problem should also be reported for action by repair crews. Leakage, broken parts, bad operation, corrosion, and other major defects should be repaired as soon as possible after the defect is reported. If repairs are to be performed in the field, the repair crew should take a full complement of repair parts to the job site.

NOTE: Before any repair takes place, the fire department must be notified.

To obtain the exact procedure for disassembly and repair of the specific hydrant, refer to the manufacturer's maintenance manual. The following information is to be used as a general guideline. If it appears to conflict with the manufacturer's recommendations, then the manufacturer's recommendations should be followed.

- A. Close the auxiliary valve ahead of the hydrant or use another means to cut off flow and pressure to the hydrant. **CAUTION:** Before proceeding, open the main valve a few turns to make certain pressure to the hydrant has been cut off.
- B. Disassemble the hydrant in accordance with the manufacturer's recommendations.
- C. Replace damaged parts and parts that show wear, corrosion, or signs of incipient failure. Always replace all gaskets, packing, and seals.
- D. Reassemble the hydrant and open the auxiliary valve (or otherwise pressurize the hydrant). Test the main valve for leakage.
- E. Vent the air from the hydrant and put the entire hydrant under pressure. Check for leakage, ease of operation, and drainage.
- F. Always record the repair and operating condition of the hydrant after completion of the repairs. Notify the fire department after completion of the repair.

4. Record Keeping

In order to carry out a meaningful inspection and maintenance program, it is essential to record the location, make, type, size, and date of installation for each hydrant. When a hydrant is inspected, the record should indicate the inspection date and the condition of the hydrant. If repair work is necessary, the nature of the work should be indicated. When repair work is completed, the nature of the repairs, date and other relevant information should be recorded. Other information, such as testing, pumping, ease of operation, direction of open, and number of turns to open, is also important and should be carefully recorded.

American Water Works Association (AWWA) C502, AWWA C600, and AWWA Manual M17, Installation, Field Testing and Maintenance of Fire Hydrants, contain useful information for fire hydrant installation and maintenance programs.

PART 6

CHLORINATION SYSTEM

1. Purpose & Components of the System

The purpose of the chlorination system at the Indiana Avenue Fire Pump Station is to maintain a minimum free chlorine residual of 0.2 parts per million (ppm) throughout the Conrail Water Main Extension area west of Lake Shore Avenue. The system is vacuum fed and flow proportional using a chlorine gas source. Primary components of the system include:

- A. Chlorine gas supply with regulators capable of automatic switch-over to the standby supply.
- B. Two cylinder scale for monitoring the weight of each cylinder.
- C. Regulating diaphragm with feed rate indicator and automatic flow-proportional control.
- D. Booster pump to achieve a vacuum condition.
- E. Chlorine injector for mixing the chlorine gas with water.
- F. Chlorine gas detector.
- G. Emergency 30 - minute self-contained breathing apparatus.
- H. Chlorine residual analyzer for the measurement and recording of the chlorine concentration approximately 20 feet downstream of the fire pump station.

2. Operation and Maintenance

Remote Monitoring of the chlorine feed rate, chlorine cylinder weights, chlorine leak warning and alarm indicators, and chlorine residual at the fire pump station has been provided. Operation of the system shall be performed in accordance with the equipment manufacturers operation manuals to be provided upon completion of the installation of the equipment. Operation of the chlorination system may be terminated when the water main extension becomes looped. Analysis of the proposed loop condition must be performed to evaluate the need for chlorination when and if the loop is constructed.

Maintenance of the system shall also be performed in accordance with the equipment manufacturers maintenance manuals to be provided upon completion of the installation

of the equipment. In addition, the following general maintenance tasks are recommended:

- A. The lead vacuum regulator gasket should be replaced with every chlorine gas cylinder change.
- B. The vacuum tubing should be checked for leaks with ammonia solution after every cylinder change.
- C. Replace all gaskets annually.
- D. Clean interior parts of the chlorinator annually.
- E. Implementing a plan in cooperation with the local fire department on how to handle possible chlorine emergencies.
- F. Do not perform any chlorine gas maintenance without at least one other person monitoring the work from outside of the chlorine room.

Monitoring of residual chlorine concentrations downstream of the fire pump station should be performed on a daily basis at the following locations:

- 1. At the intersection of Indiana Ave. and County Road One.
- 2. At the intersection of U.S. 33 and Tower Road.
- 3. At the intersection of Ash Road and Indiana Ave.
- 4. At the intersection of Glenwood Ave. and Eastview Drive.

PART 7

FIRE PUMP

The purpose of the fire pump at the Indiana Avenue Fire Pump Station is to maintain a minimum water system pressure of 20 pounds per square inch (psi). The fire pump is of horizontal split-case design, electrically driven, and rated to deliver 2,500 U.S. gallons per minute (gpm) at a total differential pressure of 60 psi. It is also capable of delivering not less than 150% of the rated flow at not less than 65% rated head. The electric motor is a horizontal foot mounted ball bearing induction motor rated at 125 horsepower, 3 phase, 60 hertz with open drip-proof NEMA enclosure for operation on 480 volt service.

The fire pump is automatically controlled to start on demand (pressure drop). It may also be manually started for testing purposes. Upon installation, the pump and controller shall be tested in accordance with latest edition of the National Fire Protection Association pamphlet number 20 (NFPA 20). In addition, the fire pump equipment shall be tested annually in accordance with NFPA 20. All tests shall be performed by personnel trained in the operation of the fire pump. A preventive maintenance program shall also be established in accordance with the pump manufacturer's recommendations. Manufacturer operation and maintenance manuals shall be provided upon completion of the installation of the equipment.

PART 8

RECORD KEEPING

Accurate records are essential to any effective operation and maintenance program. Following are general guidelines for establishing a records system. Example record forms have been provided as well.

A water main flushing and swabbing log (Figure 7-1) should be used during routine sub annual cleaning and flushing of the water main. This log will provide the basis for the system cleaning record and can be updated and reviewed easily.

When hydrants and valves are inspected, the record should indicate the inspection date and the condition. If repair work is necessary, the nature of the work should be indicated. When repair work is completed, the nature of the repairs, date, and other relevant information should be recorded.

Some type of basic master record is necessary to give background information on type and installation date. This information will make it easier to determine parts inventory and training requirements. This record is also useful in comparing hydrants and valves and determining which styles, nozzle thread size, and operating nuts are most common in the system.

[illegible]

V = Flushing velocity in main (fps)
D = Diameter of main being flushed (inches)

HYDRANT INSPECTION REPORT		
HYD. NO.		
LOCATION		
P R E S S U R E S	NOZZLE	
	INITIAL	
	RESID.	
	PITOT	
FLOW (GPM)		
TIME FLUSHED (MIN)		
WATER USED (GAL)		
PAINT		
CHAINS		
CAPS		
STEMS		
PACKING		
"O" RING		
TOP NUT		
VALVE		
VALVE SEAT		
COND. OF WATER		
REMARKS		
BY:		DATE:

FIGURE 7-3

HYDRANT MAINTENANCE REPORT			
Water Utility			
Location			
Caps Missing	Replaced	Greased	
Chains Missing	Replaced	Freed	
Paint O.K.	Repainted		
Oper. Nut O.K.	Greased		
Nozzles O.K.	Cauked	Replaced	
Valve & Seat O.K.	Replaced		
Packing O.K.	Tightened	Replaced	
Drainage O.K.	Corrected		
Flushed	Minutes	Nozzle Open	
Pressure Static	Residual	Flow	gpm
Branch Valve Condition			
Any Other Defects			
Date Inspected:		By:	
Date Corrected:		By:	

FIGURE 7-4

VALVE INSPECTION REPORT	
VALVE NO.	
LOCATION	
VALVE SIZE	
VALVE TYPE	
MAKE AND MODEL	
DATE OF INSTALLATION	
REMARKS:	
REPAIRS RECOMMENDED:	
REPAIRS MADE:	
DATE:	BY:

FIGURE 7-5

PART 9

OPERATION AND MAINTENANCE QUALITY ASSURANCE PLAN

The foregoing operation and maintenance plan should be adopted and implemented by the City of Elkhart and made a condition of the proposed operation and maintenance agreement previously referred to. The City's existing program is very similar in scope and format. Accordingly, the operation and maintenance of the proposed system can easily be incorporated to the maintenance program already in place and therefore continued after the improvements become part of the City's dedicated municipal system.

During the initial one year operating period, maintenance records for the water system extension should be supplied to Conrail semi-annually and forwarded by Conrail to the U.S.E.P.A., if required. This should be made a condition of the proposed operating and maintenance agreement. By monitoring the maintenance operations in this way Conrail will be able to verify that maintenance is carried out in accordance with the plan.